CHAPTER 4

Arable Agriculture and Plant Husbandry in the Study Region

In this chapter, I will examine the evidence for plant husbandry during the later Iron Age and Romano-British periods with particular reference to northern England and the study region. I will also investigate the potential uses of non-cereal plants amongst Iron Age and Romano-British communities, and the possible social and symbolic importance of plants and plant husbandry practices to these people.

Figure 4.01. *Experimental ploughing using an ard pulled by two oxen, Lejre Experimental Centre, Denmark. (Source: © Lejre Experimental Centre).*

General discussions of later prehistoric arable agriculture in northern England

The poor soils often found in northern England today have contributed to the idea of the region as 'marginal', and many earlier archaeological accounts emphasised the primitiveness of the indigenous population and their dependence on pastoralism (e.g. Piggott 1958; Rivet 1958; Wheeler 1954). Even the allegedly endemic nature of Iron Age 'tribal warfare' was regarded as 'retarding cereal cultivation' in northern England (Higham 1991: 95), despite earlier suggestions that significant cereal cultivation had taken place (Raistrick 1939: 129). Some authors have proposed that there was a

dramatic climatic downturn around 1000-800 BC with many upland areas abandoned altogether (Baillie 1991, 1995; Barber 1982; Burgess 1985, 1989), although this view has been challenged (Buckland, Dugmore and Edwards 1997; Tipping 2002; Young and Simmonds 1995, 1999). More detailed considerations of the evidence have concluded that arable agriculture was much more significant than had been proposed (e.g. Haselgrove 1984; Huntley and Stallibrass 1995; van der Veen 1992).

Iron Age crops and arable practices

During the Iron Age, the range of plant foods utilised in Britain was greater than any previous period, and also more extensive than in any subsequent period until the agricultural diversification of the late nineteenth and twentieth centuries.

Cereals

Einkorn wheat (*Triticum monococcum*) was cultivated during the early Neolithic, but became less important thereafter (Reynolds 1979: 64). Emmer wheat (*Triticum dicoccum*) (Fig. 4.04) was the dominant during the later Neolithic and Bronze Age, but declined in use during the first millennium BC (Jones 1996: 32; van der Veen 1992: 2), although it remained the bread wheat of the Roman military. During this period, spelt wheat (*Triticum spelta*) increased in importance and was common in the Romano-British period. Spelt is hardy (Jones 1987: 59-60, 1996: 32), and tolerant of diseases and pests. It was often stored as whole spikelets which were less susceptible to insect or fungal attack. A functionalist perspective might see the increase in spelt as a response to climatic deterioration and expansion into formerly uncultivated areas (Jones 1981). The situation was likely to have been more complex than this.

Emmer and spelt wheat may have been grown as a mixture together, or as separate crops that received similar treatment. If farmers decided to expand the areas available to them for cultivation but without an increase in traction, manure and labour, then soil deterioration might result. Under these conditions, spelt might have competed

better because of its tolerance for poorer soils, and without conscious selection may have increased in proportion (van der Veen and O'Connor 1998: 133). There were regional and intra-regional variations within this overall pattern, based on soils, altitude and rainfall, and cultural preferences. Emmer remained significant in Iron Age plant assemblages in south-western and northern England and Scotland (M. Jones 1981, 1996). On one group of Iron Age sites in north-eastern England, van der Veen found that emmer was still important, with some spelt, barley and arable weeds indicative of digging/ploughing, weeding and manuring. The other group of sites was characterised by spelt, barley and weeds indicative of more limited soil working and manuring, and less fertile soil (van der Veen 1992: 138-139). This may have represented the difference between *intensive* and *extensive* arable production (van der Veen and O'Connor 1998: 132-133).

Figure 4.02. *Before the harvest, Vaud, Switzerland. (Source: Berger and Mohr 1982: 225).*

Bread wheat and club wheat (*Triticum aestivum*) are usually grouped together because of their morphological similarity. They are free-threshing, making it easier to separate the grain from the chaff and to transport it (Green 1981; Greig 1991; M. Jones 1981). Increasing from the Iron Age onwards, it became more prevalent during the Romano-British period, though it was rare at some sites and very abundant at others (Greig 1991: 309). As a free-threshing grain it may be under-represented in some palaeobotanical assemblages.

Six-row hulled barley (*Hordeum vulgare*) was another common Iron Age cereal, thriving on both light and heavy soils and at higher altitudes, and capable of either spring or autumn/winter sowing (M. Jones 1996: 32). Some two-row barley (*H. distichum*) is also known, which when unparched may have been used for animal fodder (van der Veen 1992: 74-75), but also for brewing. Oats (*Avena*) thrive in cool, moist climates (Zohary and Hopf 1993), but it is unclear if it was cultivated. Florets of the cultivars (*A. sativa* and *A. strigosa*) have been found, but many remains are the wild *A. fatua* or *A. ludoviciana* (M. Jones 1981, 1996) that may have been 'weeds' within other crops. Roman literary evidence suggests that oats were better known in their wild form (Spurr 1986: 61). Oats prefer milder and moister growing seasons than wheat or barley, and are normally spring sown. Rye (*Secale cereale*) has only recently been identified as a significant prehistoric crop, and its cultivation might have begun in the Bronze Age (M. Jones 1996: 33). It is also free-threshing, tolerant of acid and/or drier soils (van der Veen 1992: 2), and can be sown in spring and autumn.

Figure 4.03. *Reconstruction of an Iron Age 'sickle' (or spar hook). (Source: Reynolds 1979: 65).*

Many weed species including low-growing plants such as chickweed (*Stellaria media*), blinks (*Montia fontana* ssp. *chondrosperma*) and corn spurrey (*Spergula arvensis*), suggest that cereals were harvested by cutting low on the stalk/straw, or by uprooting (Moffett 1992: 82). Peter Reynolds at the Butser Ancient Farm (1979: 64-

65, 1981: 112-113) noted difficulties in cutting cereal stalks using replicas of 'sickles' found at southern English sites such as Danebury, and suggested the heads of cereals were plucked off and collected, with the straw cut afterwards. The 'sickles' might actually have been spar-hooks, used to split hazel rods and make willow withies.

Additional potential food species

Two Iron Age legumes were peas (*Pisum sativum*) and Celtic bean (*Vicia faba minor*) (M. Jones 1989: 23; 1996: 33) (Fig. 4.04.), with nitrogen-fixing nodules in their roots and that can be rotated with cereals to maintain soil fertility (Reynolds 1979: 65). Hints of Roman crop rotation were found in a corn drier at Barton Court Farm in Oxfordshire, with Celtic bean and flax seeds and cereal remains that were possible residues from a previous year's crop (M. Jones 1981: 113).

Figure 4.04. (above left). *Emmer wheat.* **Figure 4.05. (above right).** *Celtic bean. (Source: Reynolds 1979: 56, 66).*

Vetch (*Vicia sativa*) and fat hen (*Chenopodium album*) were cultivated or at least benignly tolerated amongst cereal crops, as their seeds are common on Iron Age and Romano-British sites, with fat hen occasionally in 'hoarded' deposits (Reynolds 1979: 65). Vetch provides edible fruits, and a late herbage crop for animals. Apart from its nutritious seeds, fat hen can be eaten raw, cooked as a leafy green (Mabey 1998b: 20-

21), or used as animal fodder. It grows in well-manured soils or on the edges of dung heaps and middens, so it may have seeded itself (Reynolds 1979, 1995). Maturing quickly, if a cereal crop failed early, a crop of fat hen could be obtained within three and a half months, so may have been useful insurance against hard times.

Other potential species often dismissed as weeds of crops and waste ground but which have edible seeds, fruits or leaves include black bindweed (*Convolvulus arvensis*), pernicious charlock (*Sinapis arvensis*), chess or brome (*Bromus secalinus/mollis*) (Hubbard 1975; M. Jones 1981; Reynolds 1979: 69, 1981: 116-117). Some brassicas such as wild cabbage, turnip and black mustard might also have been utilised in the Iron Age (Jones 1996: 33), whilst other potential food plants include Good King Henry, pignuts, salad burnet, nettles, dandelions, water-cress, turnips, wild lettuces, parsnips and carrots, common bistort, sorrel and a host of herbs, nuts, berries and wild fruits (Mabey 1998b; Ryley 1998). Many of these are found on disturbed ground, and might have been present in or around enclosures and on the edges of cultivated fields.

Other useful plants

Flax (*Linum usitatissimum*) was cultivated from the Bronze Age, possibly for its oil-rich seeds but also for fibres for cloth, and for animal fodder (Dark and Dark 1997: 108; Reynolds 1979: 66). Nettle, hemp, lime bast, reed, rush, sage and clematis fibres might also have been used for clothing, baskets, bags and rope (Dark 1999; Hurcombe 2000; M. Jones 1991, 1996). Woad may have provided cloth dyes and perhaps body decoration, and other potential dye plants might have included walnut, common agrimony, fustic, weld and dyer's broom (Hall and Tomlinson 1990; Plowright 1901). Elder can be also used for dyes, with black colour derived from its bark, green from its leaves, and blues and purples from elderberries (Miles 1999: 232-233). Its flowers have been used as herbal remedies and diuretics. Potential medicinal plants could have included comfrey, self-heal, colts-foot, vervain, pennyroyal, opium poppy, marsh mallow, greater celandine, henbane, deadly nightshade and foxglove (Mabey 1998b; Ryley 1998). With some of the latter, the fact these plants could heal or kill may have leant them and those who used them particular potency.

Bracken, rushes and heather might have served for animal bedding (M. Jones 1991, 1996), and heather found at Dunston's Clump, Scrooby Top and Bunny (Bogaard 2000: 184; G. Jones 1987: 59; Wilson 1968: 44) may suggest it too was used as animal bedding. Willow may have been cut to provide withies, and hazel and alder coppiced to provide rods for fences, gates, walls and other structures. I have noted the potential of oak, beech, ash and elm leaves as fodder for livestock in Appendix B. Rare waterlogged contexts elsewhere in Britain have produced wooden agricultural tools, household implements, turned and incised bowls and stave-built 'buckets' (e.g. Bulleid and Gray 1911; Coles and Minnit 1995; Rees 1979). Given the paucity of Iron Age ceramics within much of the study region (see Chapter 10), especially 'domestic' pottery assemblages, the importance of containers of wood, basketry and leather is likely to have been even greater than in other parts of Britain.

Figure 4.06. (above left). *Harvesting rushes in Devon, 1930. (Source: Ward 1991: 40).* **Figure 4.07. (above right).** *Basket making with willow withies, River Severn, 1948. (Source: Ward 1991: 44).*

By the Iron Age, woodland management was probably undertaken through plot-felling, with managed stands coppiced in identifiable cycles (Buckland 1986: 4; Morgan 1982). Romano-British coppice pole fragments were found at Menagerie Wood (Garton, Hunt, Jenkinson and Leary 1988: 29), and waterlogged planks from coppiced trees at Wild Goose Cottage (Garton and Salisbury 1995: 40-41). Rod fragments of ash, and worked round wood or boards of oak, alder, beech and willow were found at Balby Carr (Allen 2005; Gale 2005; Hall et al. 2005). Wood chips and tool marks at this site also attest to woodworking.

The social lives of plants

Johnston (2005b) recently drew attention to the upland evidence for small garden plots in northern and western Britain during the Bronze Age. He highlighted the need to consider the 'in-between places' around buildings, boundaries and in uncultivated corners of fields. Many plants growing in such places might have had medicinal and/or magical or ritual importance, and these niches might have been deliberately set-aside for them and their growth encouraged. Drawing on ethnographic evidence (e.g. Crook 1999; Finerman and Sackett 2003; Harris 1989), he suggested that in prehistory people made no clear distinctions between cultivated plants and 'wild', gathered resources (Johnston 2005b: 216). Small garden plots might not appear to be of great economic or social significance, but being so close to dwellings would have embedded these plants and practices within socialised (and perhaps gendered) domestic spheres. Many of Johnston's arguments are equally applicable to the enclosures and fields of the study period. Some internal spaces within enclosures could have been small garden plots, and many of the potential food and medicinal species noted above would have thrived in untended corners.

In Chapter 3 I noted the social and symbolic importance of animals, and argued that the biographies, identities and memories of animals and people were interwoven through mutual and interdependent rhythms of agency, life and movement. Some proponents of Actor Network Theory suggest that trees can affect human perceptions and experiences of landscapes through changing seasonal and annual qualities (Jones and Cloke 2002: 69-70; Rival 1998: 7-9). Trees and other plants may be caught up in metaphorical and cosmological conceptions of birth, growth, maturation and ancestry (e.g. Bloch 1995: 68; Bonnemère 1998: 115-126; Giambelli 1998: 138-141; Mauzé 1998: 236-238; Utagawa 1999: 257; Wada 1999: 266). Although some have explored the social meanings of animals in later prehistoric and Roman Britain (e.g. Black 1983; Grant 1991; Hill 1995; Wilson 1999; Smith 2005), this has not been the case for plants, aside from considerations of the iconography of cereals on some late Iron Age coins (Creighton 1995, 2000). In Neolithic studies, researchers have begun to explore the potential symbolism of plants and their incorporation in deliberately structured deposits (e.g. Fairburn 2000: 115-119; Thomas 1999: 25).

Ethnographic evidence suggests that plants may form the basis of human symbolic beliefs and practices. Some communities in Australasia and Melanesia people claim descent from ancestral plant beings, and may regard cultivated plants such as yams as sentient beings (Battaglia 1990; Bowden 1983; Crook 1999; Seaglion 1999; Sillitoe 1983, 1999). I do not wish of course to directly transpose such specific beliefs back into an archaeological context, but the importance of cereals and other edible plants for human subsistence, exchange networks, the seasonality of plant growth and the communal effort expended in planting and harvesting crops would probably have entangled them firmly within beliefs and practices associated with identity, exchange, fertility and the cycles of the seasons.

The communal consumption of plants in feasts, and especially as ale, might have been an important part of practices commemorating calendrical events or births, marriages and deaths. The evidence for Iron Age and Romano-British feasting within Britain as a whole and the study region in particular is outlined in Chapters 10 and 11. Plants might also have been caught up in competitions for status between different groups or individuals (q.v. Fairburn 2000: 117), as quantities of grain or ale. Specific communities or social groups within communities might have identified themselves through particular plants. Even in post-medieval Britain, beliefs and practices concerning boughs, John Barleycorn and harvest festivals might have exhibited similar concerns (Hutton 1996a, 1996b). To this must also be added the importance of plants in medicine and magic, and the sensual impact of their colours and smells.

> There are plants used as food, for medicine, as construction and structural material, as raw material for necklaces, bracelets, headdresses, as hafts for axes and shafts for arrows and spears. There are plants woven into baskets, wickerwork and cloth, laid as trackways, burnt as aromatics and processed into dyes…There are also…plants as foci for exchange, as totemic signs of identity and membership, as tokens of luck or protection, or as icons – windows into other spheres dominated by spirits or ancestors. Finally, of course, there are plants indicative of the maps and patterns of the greater world: plants as liminal markers, as passages, gateways and thresholds, and plants as environments and habitats for [humans,] animals, insects and other flora. (Swogger 2000: 178-179, my addition in parentheses).

Technology and tools

There is a vast and slightly obsessive literature on prehistoric and Roman agricultural implements (e.g. Curwen 1927, 1938; Fowler 1971, 1983; Manning 1964, 1971; Payne 1957; Rees 1979, 1981; White 1967), a useful summary of which can be found elsewhere (Fowler 2002: 161-181). Wooden hoes and simple digging sticks might have sufficed for small plots and gardens. Late prehistoric ploughing was undertaken with bow ards, which by the later Iron Age were fitted with iron shares, and this was probably still the most common ploughing implement in Roman Britain, although more complex sole ards were probably in use by then too. In order to break up the soil cross-cultivation might have been necessary, and in many parts of Britain ard-marks at right angles to one another have been excavated (Dark and Dark 1997: 101; Evans and Hodder 2006: 133-134). These often seem to relate to just one or two phases of activity, however, and rather than routine cultivation might reflect initial ground breaking and slightly deeper ploughing into the subsoil following clearance.

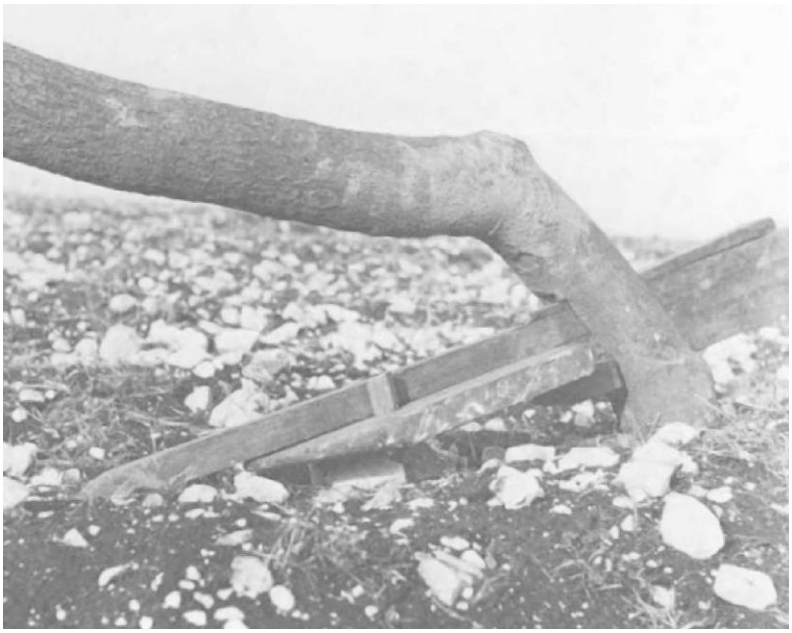

Figure 4.08. *Experimental reconstruction of a bow ard. (Source: Reynolds 1979: 62).*

Later Roman ploughs may have had longer and heavier shares and coulters, although it is still debatable whether mouldboards were introduced in the Roman or post-Roman periods (Fowler 2002: 214; Jones 1989: 131; Manning 1964; Rees 1979: 59-

61). Such ploughs allowed soil to be broken up more easily by ploughing in only one direction, and permitted the cultivation of heavier soils. Weeds such as cornflower, corncockle and stinking mayweed increased during the Romano-British period, perhaps linked to a shift to deeper ploughing and more intensive arable regimes (Fowler 2002: 212).

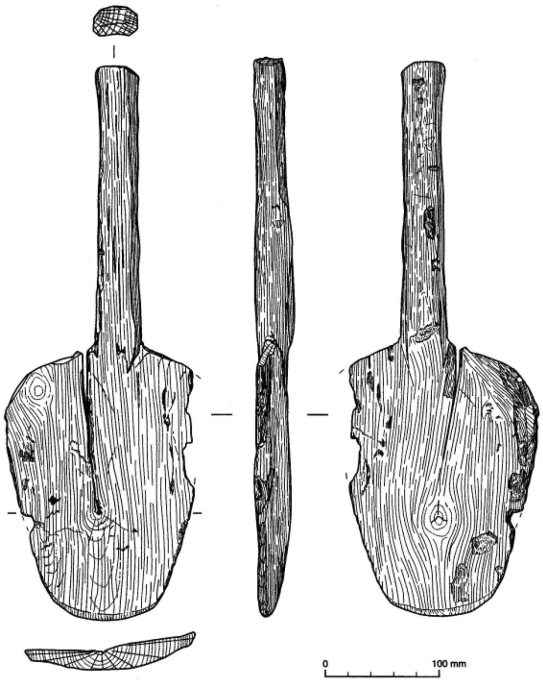

Figure 4.09. (left). *Spademarks revealed in the base of ditches excavated at East Carr, Mattersey, Nottinghamshire. (Source: Knight, Howard and Leary 2004; Morris and Garton 1998a: 54, fig. 3, 1998b).* **Figure 4.10. (bottom left).** *An iron spade shoe recovered from the base of an excavated ditch at Lincolnshire Way, Armthorpe, South Yorkshire. (Source: Roberts forthcoming).* **Figure 4.11. (bottom right).** *A wooden spade recovered from waterlogged deposits within a ditch near the enclosure at Bottom Osiers, Gonalston, Notts. (Source: Knight and Elliott forthcoming).*

Many Iron Age and Romano-British implements would have been mostly or entirely wood (Fowler 2002; Rees 1979), as was the case well into the recent historic period, and most iron blades or fittings and wooden handles would have been recycled, leaving only a few excavated examples. At East Carr, Mattersey, some field ditches were dug into alluvial clays that preserved marks from a Romano-British wooden spade with an iron spade shoe (Morris and Garton 1998: 54-61) (Fig. 4.09). A waterlogged object of alder that was probably an Iron Age spade was found in the bottom fill of a ditch cut into the alluvium at Bottom Osiers, Hoveringham Quarry, Gonalston (Knight and Elliott forthcoming) (Fig. 4.11). At Lincolnshire Way, Armthorpe, an iron spade shoe was excavated from a Romano-British field ditch (Roberts forthcoming; Rose and Richardson 2004) (Fig. 4.10), and a less well preserved example was also recovered from the well at Dalton Parlours (I.R. Scott 1990: 204, fig. 120). These separate but remarkable finds represent an almost complete suite of evidence for one form of digging tool.

Nevertheless, some digging tools with an extremely long prehistoric provenance were still utilised. Recent excavations at Wattle Syke near Wetherby recovered several antler picks deposited near the corner of a late Iron Age or Romano-British enclosure ditch. Although probably a placed deposit, the tines on the antlers were worn, and they had clearly been used for digging. Antlers that had probably been used as digging tools were also recovered from a layer above a Roman road at the fort in Ilkley (Woodward 1925: 290, fig. 48).

Figure 4.12. (left). An antler pick being excavated from near the base of an enclosure ditch at Wattle Syke, Wetherby, W. Yorks. Source: © AS WYAS.

General discussions of Romano-British arable agriculture and plant husbandry

It has been proposed by some authors that following the Roman occupation of Britain there was an increase in cereal cultivation and improvements in agricultural techniques (Fowler 2002; Frere 1987; Grant 1989; Higham 1991; M. Jones 1981, 1991), which along with a proposed expansion in livestock numbers is attributable to Roman taxation (Branigan 1984: 30). Although perhaps true for parts of central-southern Britain, evidence for this is largely absent in northern England. Such views fit within the progressive, evolutionary accounts of the Romanisation of Britain established early in the twentieth century. Innovations such as metal ard-share tips pre-date the occupation (Fowler 2002: 188; Millett 1990: 97), and it might not have been until the third century AD that the introduction of coulters and large shares took place. Many authors mention Roman inventions such as the *vallus*, a reaping machine described by Pliny and depicted on continental sculptures (Reynolds 1981: 120), but there is no evidence that these were ever used in Britain. Watermills are known (Fowler 2002: 174; Moritz 1958), including examples from Stanwick, and Chesters and Birdoswald on Hadrian's Wall, but none have been found within the study region.

Figure 4.13. *Bronze statue of a Romano-British plough team found near Piercebridge, Co. Durham. As one of the animals is an ox and the other a cow, however, this might not represent 'normal' ploughing, but a ritual lustration of the fields or a town foundation (q.v. Manning 1971). The portrayal of such a scene may in any case have had symbolic connotations. (Source: Fowler 2002: 185).*

Some changes that did occur during the Romano-British period included a decline in the importance of spelt and emmer wheat, whilst bread/club wheat, rye and oats became more popular (Fowler 2002: 212; Greig 1991: 309; M. Jones 1996: 31-32). Winter cropping of wheat probably began after the occupation. It has been claimed that the Romans introduced cabbage, parsnips, turnips, carrots and flax (Day 1997), but flax was present in prehistoric Britain, and the other species occurred as wild varieties (M. Jones 1996: 33; Mabey 1998a), although new variants might have been imported. The introduction of hay cropping may have taken place, with no firm evidence of it before the Roman occupation (Greig 1984; M. Jones 1991: 23, 1996: 29-30; Lambrick 1992; Lambrick and Robinson 1988). Winter fodder in the Iron Age might have mostly been obtained from hedge and woodland leaves, and from barley grain and straw. Although river floodplains may have continued to be seasonally used, many may have been converted to hay meadows.

Figure 4.14. *Men and women hay-making, Haute-Savoie, French Alps. (Source: Berger and Mohr 1982: 212).*

Many writers have stated that agricultural expansion into new areas and onto new types of soils took place (e.g. Fowler 2002; Frere 1987), and reclamation of parts of the East Anglian Fens and the Gwent and Somerset Levels along the Severn estuary may have begun during the Romano-British period (Allen and Fulford 1986, 1990;

Dark and Dark 1997: 103-104; Fincham 2002b; Fulford 1990: 29; Grove 2002; Malim 2005; Meddens and Beasley 2001; Rippon 1996, 1997, 2000). This reclamation may have been more piecemeal than is often proposed, and some of the drainage may have begun in late prehistory (Millett 1990: 120-121). The presence of Romano-British pottery in extensive drainage ditches suggests a large-scale approach to reclamation beyond many small-scale Iron Age communities, but these communities were also capable of laying out widespread systems of co-axial fields and trackways. The lack of pre-Roman finds need not indicate that there was no pre-Roman activity, particularly as it took place in regions where Iron Age pottery was also scarce.

There is a possible literary reference for Romano-British viticulture (Hyams 1949), but archaeological evidence for grape cultivation has been found at Wollaston in the Nene Valley of Northamptonshire, and at North Thoresby in Lincolnshire (Brown and Meadows 2000; Brown, Meadows, Turner and Mattingly 2001; Webster, Webster and Petch 1967). This suggests it was more widespread than once thought (cf. Williams 1977), and may be further indication of the mild climate during the Romano-British period. Alexanders, fennel, marjoram, dill, coriander, acanthus, onions, chives and marigolds were all plants introduced to Britain by the Romans for culinary and/or medicinal use, in addition to madder for red dyes (Mabey 1998b; Ryley 1998).

There were probably considerable continuities in many areas between 'native' and 'Roman' rural landscapes, with changes often developments within existing landscapes rather than the superimposition of new agricultural systems (Dark and Dark 1997: 94-95, 113). It was proposed that extensive clearance detected around Hadrian's Wall was associated with the Roman military's need for timber and large-scale cereal production (Dumayne 1994; Dumayne and Barber 1994). Many of these clearance episodes now seem to date to the later Iron Age (Dark 1999; Huntley and Stallibrass 1995; Tipping 1997; van der Veen 1992). Existing native agricultural practices were possibly capable of meeting increased demand (Millett 1990: 98). The significance of the Roman occupation may have been in terms of rights and control over production, and in the transportation, distribution and storage of produce, and practices of processing and consumption (Jones 1982: 101; Meadows 1994, 1997).

Intensive and extensive agriculture and 'expansion'

Many authors have explored distinctions between 'intensive' and 'extensive' agriculture. It has been argued that during the Bronze Age there was a move from long fallow to short fallow agriculture, characterised by annual or multi-cropping, shorter periods of fallow, and changes such as increased traction ploughing, manuring and soil management and conservation (Barrett 1994: 143-144; Harding 1989: 178-179). Such interpretations were based on earlier, influential characterisations of different intensities of land use and social organisation (Boserup 1965; Goody 1976). Barrett interpreted the appearance of extensive field systems in Britain during the early-mid Bronze Age as a shift towards more intensive, short fallow agriculture and increased production. Recent work on Cranborne Chase, however, failed to identify any significant changes in production following the appearance of field systems (French et al. 2003; Lewis forthcoming). Great caution should thus be exercised in viewing archaeological evidence for land allotment and land division as evidence for concomitant increases in production and agricultural intensification.

Van der Veen and O'Connor (1998) distinguished between agricultural intensification and extensification. They define intensification as raising the output (in terms of volume of cereals and/or increased head of stock) per unit area of land by increasing the input through labour or other resources (such as manuring and/or technology), but in intensive systems although the return per area might be high, the return per capita is often low. Horticulture is a classic example of this. Extensive agricultural systems signify the increase of output by enlarging the area under cultivation or pasture, without an associated increase in labour or other inputs (van der Veen and O'Connor 127-129). They thus have a low input and low return per area, but a higher return per capita, and sheep rearing and large-scale cereal cultivation are examples of this. In practice there are rarely such clear-cut divisions. Van der Veen and O'Connor identified a series of agricultural strategies involving forms of agricultural expansion (van der Veen and O'Connor 1998: 129). These include an increase of the areas under cultivation and/or pasture into new areas by new people, without changes in animal or plant husbandry techniques; an increase in yield within existing farmed areas through

new crops or animals, without changes in animal or plant husbandry; and an increase in yield through changes in animal or plant husbandry which might involve either more intensive practices, or more extensive cultivation and/or pastoralism. Other changes might involve a shift towards more specialised husbandry of particular crops or animals as part of a market and/or cash economy, and a move towards non-domestic modes of production with surpluses for trade or sale as a result.

Arable agriculture in the field systems – theories and evidence

Some explanations for land use in the region's field systems have noted that most modern soils are of too poor quality to support much arable agriculture without significant input from artificial fertilisers and pesticides, and are prone to wind and water erosion. Riley suggested that:

> The land near the rivers would have been suitable for meadows to be grazed by stock, but higher up the sandy soil on the ridges between the rivers would have been too dry in summer to be good for grassland. It would also have become liable to become infested with bracken. These light soils would have been ploughed easily with primitive equipment, but their acid nature would only have suited oats or rye…and crops of other cereals would have been poor, in the absence of lime which is applied by farmers at the present day (Riley 1980: 26).

The 'brickwork' fields recorded by Riley average 1-2 hectares in area (Riley 1980: 26), larger than the 'Celtic' fields of the Wessex region that were mostly 0.1-0.6ha (Bowen 1961: 20; McOmish, Field and Brown 2002: 54; Reynolds 1979: 52), which Reynolds suggests could be ploughed or harrowed in a single day. Riley argued that the comparatively large size of many 'brickwork' fields in particular would have been too great for ploughing with the equipment available in the later prehistoric or Romano-British periods. Unless evidence could be found for subdivisions within the larger fields, which would of course be difficult given centuries of later ploughing, then Riley thought that they might well have been laid out to retain animals.

Hayes agreed that many 'brickwork' fields were too big for arable agriculture given the likely available workforce, but argued that due to the poor grazing and lack of water sources a pastoral 'economy' based on sheep was likely (Hayes 1981: 117). Branigan suggested that if the arable land associated with a particular settlement was 100ha rather than the 150ha proposed by Hayes, even with two families in each settlement there would still have been a shortage of labour at key points in the agricultural year such as harvest time. He also noted the extremely small quantities of pottery found outside enclosures during fieldwalking, which he thought indicated that manuring did not take place. As he regarded the soils over the Sherwood Sandstones as nutrient poor, he too therefore argued that the 'brickwork' fields were primarily for pastoral agriculture. However, he proposed that sheep were not kept for meat as Hayes suggested, but to supply an expanding Roman wool industry (Branigan 1989: 164). He thought these fields were part of extensive, centrally managed Roman estates, with enclosures representing the settlements of estate workers.

There are several fundamental misconceptions in all these arguments. The first is that modern soil characteristics and modern 'common sense' farming techniques can be transposed back in time to the later prehistoric and Romano-British periods. This is highly questionable. Many of the soils in the study region today are indeed of poor quality, but they are the products of over two thousand years of cultivation, and over this time their nutrient quality has surely deteriorated. Deposits of periglacial, wind-borne loess used to cover many of the Magnesian Limestone areas (P. Buckland pers. comm.; Jarvis et al. 1984), and these are usually very fertile but vulnerable to water and wind erosion. Such loess only survives today in a few isolated pockets. Similarly, many of the soils above the river valley or Sherwood sandstone sand and gravel deposits are also easily windborne, being free-draining and prone to dryness. Modern 'sand blows' were noted by Riley (1980: 69, plate 16), and may have been detected in deposits at sites such as Ferry Lane Farm, Collingham, where layers of sand up to 0.30m thick sealed Romano-British features (Bourn, Hunn and Symonds 2000: 99). There is also considerable evidence for alluviation and colluviation at sites along the Rivers Trent and Idle (Elliott and Knight 1998; Knight, Howard and Leary 2004: 117-120; Samuels and Buckland 1978, see Chapter 1). By the late third and fourth centuries AD, increased flooding and alluviation might have caused many low-lying

settlements to be abandoned. The anthropogenic processes causing or at least contributing to these regional trends are likely to have included further woodland clearance and increased cultivation, perhaps exacerbated by deep-ploughing techniques capable of severing root mats, and the sowing of winter as well as summer crops (Knight, Howard and Leary 2004: 120).

Medieval and post-medieval ploughing might have caused greater soil degradation, although across much of the Sherwood Sandstones land use in these periods seem to have consisted mostly of sheep pasture (Mingay 1989: 4), with turnips and other fodder crops introduced later (Lyth 1989: 39-43). In the Trent Valley, a more mixed medieval agricultural regime included barley and oat growing (Lowe 1798: 28, referenced in Garton, Leary and Naylor 2002: 37). Early modern and more recent agriculture has produced more profound changes. At Hunster Grange Farm, just south of New Rossington, an archaeological evaluation in 1991 investigated an area where 'brickwork' fields and a double-ditched trackway had been identified (Riley 1980: 94, map 8). Only a few ditches were located, however, despite cropmarks being visible in the field prior to fieldwork, and in surrounding fields during the project (D. Riley pers. comm.). This probably resulted from soil erosion through ploughing and erosion, confirmed by the farmer who over ten years had noted the increased visibility of his house over the ridge from a neighbouring hill (Sydes 1991: 24). At least 1-2m of the gentle ridge at Hunster Grange Farm had disappeared. The continued presence of cropmarks might be explained through the retention of chemical 'ghosts' within the subsoil – even though the ditches had been ploughed out, leaching of minerals through the soil profiles might have created changes in the underlying drift geology that continued to affect plant growth above (C. Merrony pers. comm.).

Due to this long history of ploughing and erosion, buried soils have rarely been encountered on most archaeological sites, with the exception of deposits preserved beneath prehistoric linear earthworks such as Becca Banks and Grim's Ditch in West Yorkshire (Wheelhouse and Burgess 2001), and underneath Roman roads, as at Roman Ridge and Adwick-le-Street (O'Neill 2001; Upson-Smith 2002). Without detailed soil and palaeo-environmental analyses, there is no evidence that certain soils were not viable for arable agriculture. Micromorphological and pollen analyses of

soils beneath the *agger* of a Roman road at Adwick-le-Street suggested cultivation *had* taken place prior to road construction (Usai 2004: 25-30; Upson-Smith 2002: 57). Some areas may indeed have been marginal, but not to the same degree as today, and many people may have attended to the use of soil much more carefully in the past, demonstrating knowledge of its fragility.

Furthermore, the size of the bounded field areas need not reflect the areas that were in pastoral or arable use. In Sweden, *stensträngar* or stonewalled boundaries of prehistoric and early medieval date did *not* define cultivated areas themselves, which were smaller plots within them, delineated by as areas of clearance, lynchets or traces of fencing (Petersson 1999, forthcoming; Widgren 1990: 11). These were only detected through the stripping and excavation of internal areas of fields. Once again, land allotment and land division are not necessarily the same as land use. Within the study region, where internal areas of fields have been excavated later plough truncation has usually taken place. At Balby Carr, a rare waterlogged fenceline of oak stakes was found (O'Neill 2005, fig. 5), although it was not clear if this was *within* a ditched field. It is also impossible to establish how many of the fields within particular blocks of field systems were in use for arable or pasture at any one time (see Chapter 7).

Branigan's idea (1989: 164) that a lack of pottery scatters indicates a lack of manuring around many of these settlements is extremely problematic. He assumed that manure was stored in farmyard middens which incorporated domestic refuse, and that this material was then taken out at intervals and spread onto the fields. This is very much a medieval and post-medieval pattern. Nevertheless, across the southern downlands of England for example, under the sheep : corn regime large flocks of sheep were turned out to graze on cereal stubble after harvest, and were kept overnight in temporary hurdle pens which could be moved around to ensure the maximum amount of manuring from the animals. Such practices would not result in scatters of artefacts.

Furthermore, the fieldwalking of many enclosure sites within the region, including those likely to represent 'domestic' farmsteads, usually does not produce much

ceramic material culture at all, even Romano-British pottery (see Chapter 11, Appendix F). In 1992-1997 an extensive fieldwalking programme was undertaken at South Muskham in the Trent Valley, where a high concentration of cropmarks represented pit alignments, ditched field boundaries, trackways and enclosures (Whimster 1989: 80, 1992: 11). Despite the approximately 209ha of ploughed fields walked, only 73 definite and 21 possible Romano-British sherds were retrieved, most third or fourth century grey wares, with 11 hand-made, coarse pottery sherds that could be late Iron Age or early Romano-British in date (Garton and Leary 2008: 4.1-4.2; Garton, Leary and Naylor 2002: 27). Similarly small quantities of Romano-British pottery were reported from fieldwalking carried out by the ARTEAMUS society and the Dearne Valley College at Barnburgh Cliffs (W. Kitchen pers. comm.) and at Marr Thick by Sheffield University (C. Merrony pers. comm.).

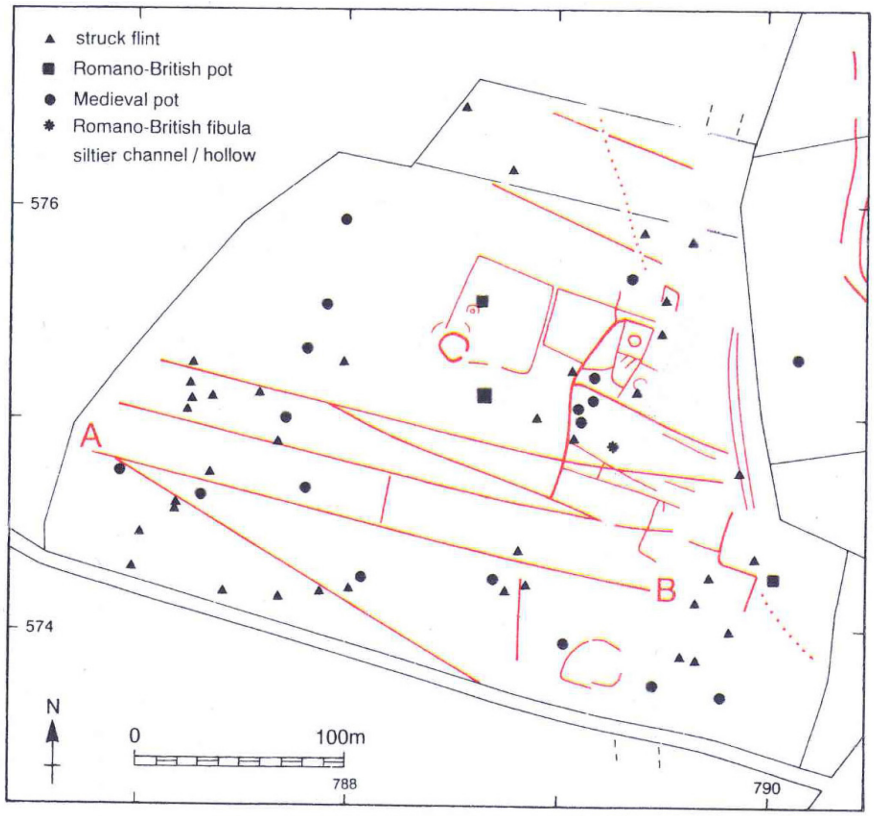

FIGURE 6: South Muskham AAI, field 8648: all artefacts plotted against cropmarks (red), and the channel/hollow shown by a darker cropmark stripe (*cf.* Plate 1). Scale 1:4000.
Cropmark plot by RCHME, © Crown copyright, NMR

Figure 4.15. *Detailed plot of artefacts recovered from fieldwalking of field 8648 at South Muskham in Nottinghamshire. (Source: Garton, Leary and Naylor 2002, fig. 6).*

This evidence suggests that many communities consumed and discarded little non-perishable material culture. Manure might thus have been entering the soil of these fields, but not with many artefacts incorporated within it. At South Muskham, for example, there were only four rather diffuse scatters of Romano-British artefacts identified, of which only one was associated with an enclosure (Garton, Leary and Naylor 2002: 34, fig. 8) (Fig. 4.15). Although the densities of pottery recovered were much smaller than sherd distributions found by fieldwalking in southern England (cf. Gaffney and Tingle 1989: 216-218), they were comparable to some in other regions such as East Anglia (Crowther 1983). In contrast, the artefacts recovered through fieldwalking 'brickwork' field systems in north Nottinghamshire were strongly associated with some enclosures (Garton and Leary 2008: 4.2; Garton in prep.; Garton, Leary and Naylor 2002: 35-36, fig. 9). This suggests that there were distinct functional practices and differences in consumption and agricultural practices between the two areas, and/or social or cultural variations. It might also indicate chronological variations too.

A final major problem with Branigan's hypothesis is that cultural factors probably influenced artefact consumption and discard (Chadwick 1999, 2004; Cumberpatch and Robbins n.d.). Many artefacts may have been deposited in rather specific places, rather than just strewn around the landscape (see Chapter 11 and Appendix F). At West Moor Park, Armthorpe for example, excavations by AS WYAS found that although most of the field and trackway ditches were devoid of finds, one otherwise unremarkable length of field ditch contained one or more large dumps of Romano-British pottery, including several near complete vessels (Evans 2001c). It was clear from the range of dates of this material that the sherds had lain or been curated elsewhere, prior to their deposition. Thus, there were no wide patterns of pottery dispersal from middens. There may also have been sorting of refuse, with organic compostable detritus separated from non-organic components. If pottery was not being thrown onto manure heaps, it would not then be dispersed across fields. Until palaeo-environmental and micromorphological sampling are used to look specifically for manuring indicators, no firm conclusions should be reached.

Palaeo-environmental and archaeological evidence for plant husbandry in the study region

The data from excavations are outlined in Appendix A, and Tables 1-3. Sites and their botanical assemblages have again been grouped according to modern county boundaries, though this is obviously an artificial divide used simply for convenience. In addition to carbonised and/or waterlogged plant remains, other evidence such as the presence of querns is also noted.

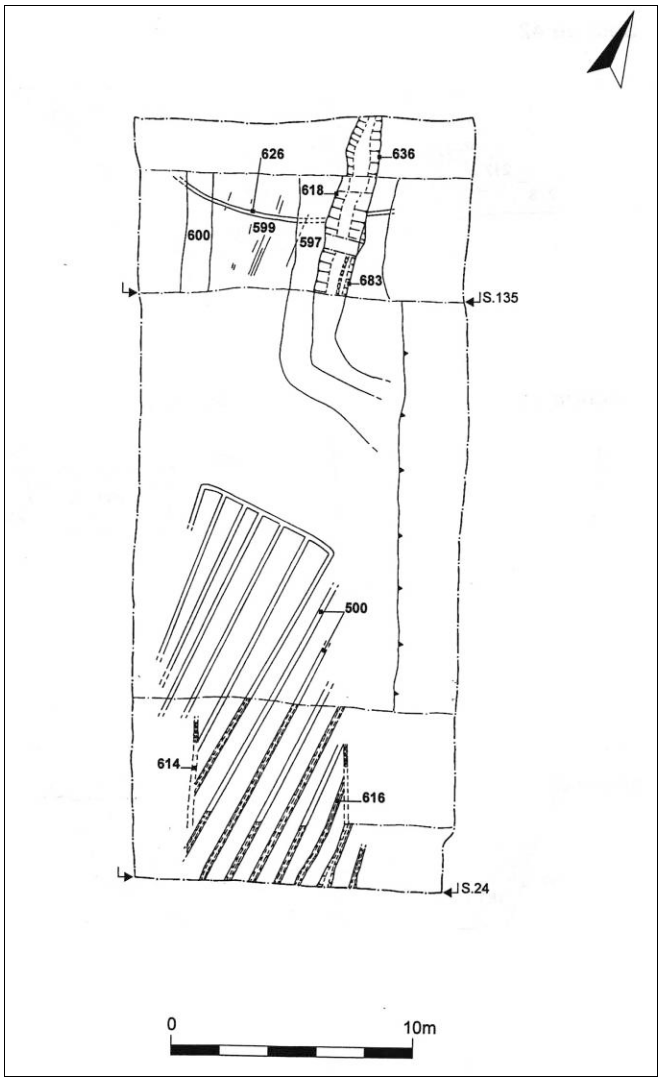

Fig. 4.16. (left). *Possible cultivation marks found underneath the agger of the Roman road at Adwick-le-Street, South Yorkshire. The northern group are most likely to have resulted from cultivation. (Source: Meadows and Chapman 2004: fig. 8).*

At Red House, Adwick-le-Street in South Yorkshire, the Roman road between Rossington and Castleford passed close (*c*. 60m) to an Iron Age and Romano-British enclosure (Area 7 E1). Sealed beneath the *agger* were a series of plough furrows (Fig.

4.16). The southernmost group of furrows were deep and filled with stones, and were probably part of the process of road construction – Roman literary sources described such practices (Meadows and Chapman 2004: 14). Another group of smaller furrows to the north, however, were likely to have been due to late Iron Age or very early Roman ploughing pre-dating the construction of the Roman road which probably took place in AD 70/71. Soil micromorphology also suggested that the deposits found underneath the road were buried soils (Upson-Smith 2002: 57; Usai 2004: 25-30).

This is the first confirmed evidence for Iron Age or Romano-British cultivation marks within the region. Possible plough furrows and ditches were identified at Thief Dale, Arnold (Garton and Malone 2002: 160), but have since been reinterpreted as plough-truncated ditch bases and periglacial 'stripes' (Garton and Guilbert 2005: 153). Other evidence for crop husbandry or processing is more circumstantial. Beehive and flat quernstones were manufactured at many locales, including the Millstone Grit stone outcropping at Wharncliffe Crags near Sheffield (Challis and Harding 1975: 23-25; Wright 1988: 74). These were distributed widely across the region, most probably leaving the site as roughouts to be finished elsewhere (Wright 1988: 74-75). English Heritage recently surveyed part of the manufacturing site in more detail (Fig. 4.17), and identified over 2300 roughouts in the survey area alone.

Square four-post structures (and similar five to nine-post structures) have been found at many Bronze Age and Iron Age sites across Britain, and are usually interpreted as raised granaries (Cunliffe 1991, 1995, 2003; Fowler 1983; Gent 1983). I discuss these features and their possible social significance further in Chapter 9, and data concerning examples from the study region are detailed in Appendix F.

Interpretation and discussion

Three interesting groups of sites can be identified through closer examination of the admittedly limited palaeo-environmental evidence. Firstly, probable cereal producing sites have been identified at Parlington Hollins East, Garforth, and Billingley Drive, Thurnscoe. As Appendix A and Tables 1-3 demonstrate, these all had similar 'signatures' in terms of their archaeobotanical evidence[1]. It is also likely that Dalton

Parlours, Swillington Common South, Dunston's Clump and Scrooby Top were also cultivating their own cereals. Secondly, Dalton Parlours, Billingley Drive, Thurnscoe, Dunston's Clump and perhaps Stile Hill Colton and Scrooby Top all have evidence for bread wheat; and these sites also displayed many 'Romanised' aspects in their architecture or material culture (see Chapter 10). This might suggest that some people who were most receptive to Roman influences were also innovators in agricultural practices, although the situation was undoubtedly complex. Topham Farm, Sykehouse, and Balby Carr stand out as very different from all of the other sites. They produced very little evidence for cereals at all. This might be further indication that occupation at these locales was focused mainly on livestock, and in terms of their low-lying landscape setting possibly took place on a seasonal basis as well.

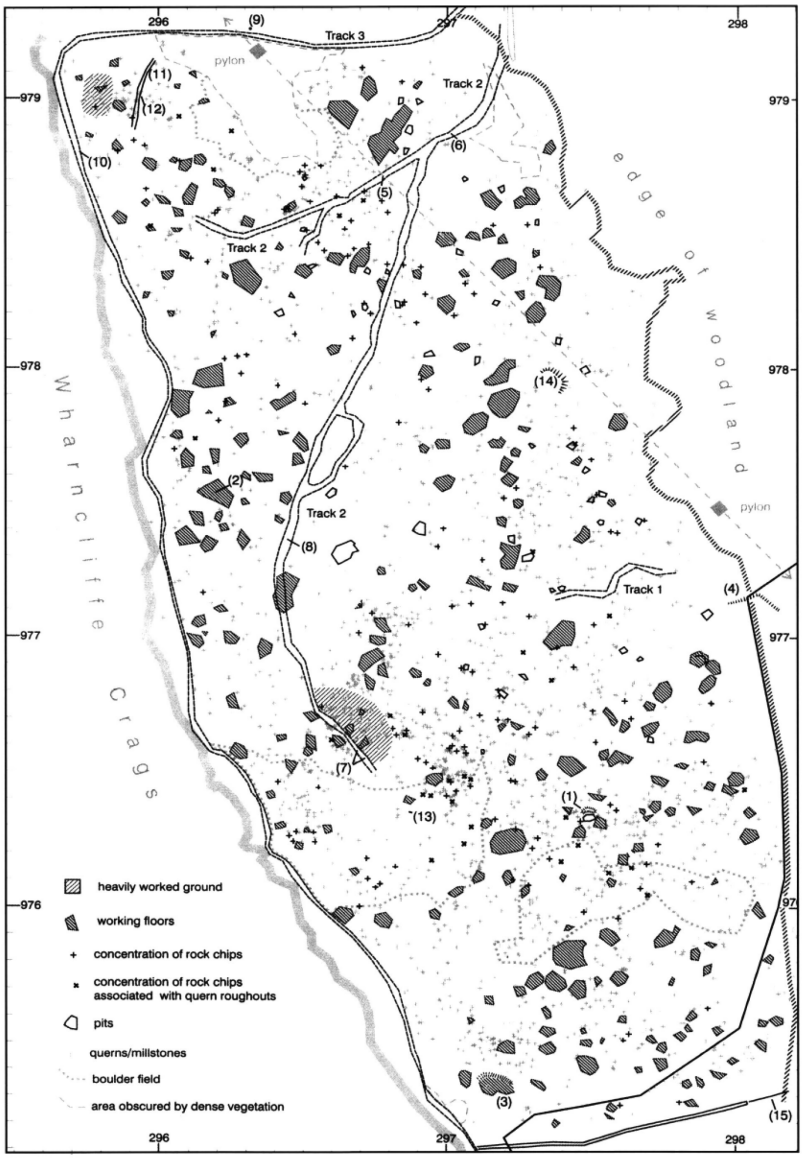

Fig. 4.17. (right). *Part of the survey of the quernstones and working faces at Wharncliffe, Sheffield. (Source: Pearson and Oswald 2005: 19).*

There is therefore growing palaeo-environmental evidence for cereal cultivation, but mostly from Magnesian Limestone areas rather than Sherwood Sandstone sites and 'brickwork' fields. To some extent this is a product of fieldwork biases, and the areas in which developer-funded archaeological work has been concentrated. Apart from Dunston's Clump and Armthorpe, few 'brickwork' field system enclosures have been excavated and subjected to systematic sampling, but the poor preservation of palaeo-environmental remains on the acidic sands and gravel soils certainly remains a considerable methodological problem. Nevertheless, as suggested in Chapter 6, the emphasis in these areas was probably more on pastoral production and livestock herding rather than arable cultivation. This question must be one key area of research for future investigations.

Figure 4.18. (top left). *Woman ploughing with two mules in Greece. (Source: Berger and Mohr 1982: 265).* **Fig. 4.19. (top right).** *Man sowing grain, 1947. (Source: Ward 1991: 26).* **Fig. 4.20. (bottom left).** *Clearing a field of stones, West Yorkshire, 1945. (Source: Ward 1991: 31).* **Fig. 4.21. (bottom right).** *Women working the fields, Valais, French Alps. (Source: Berger and Mohr 1982: 264).*

'The shadow's singing'[2] – embodied practices of plant husbandry

As with animal husbandry (Chapters 5 and 6), plant husbandry was undertaken as a series of embodied practices and daily and seasonal routines, with many tasks probably divided according to gender, age and experience. Individuals carried out some tasks, households and extended families others; whilst some were probably undertaken by different families or community groups. Sowing, ploughing, coppicing and hedge laying for example, could have been undertaken by just a few more skilled individuals, but harvesting, threshing and haymaking would have required much more labour, and several different families or kin groups may have co-operated in this. Not every family or farmstead might have owned an ard or plough, or had cattle suitable as traction animals. Some equipment and labour may have been shared, with possibilities for reinforcing social relationships, or the potential for creating disputes when equipment was broken or not returned, or help unreciprocated.

As in many contemporary small-scale agricultural societies men might have been normally responsible for ploughing and the routine care of large draught animals, perhaps with women or children leading the oxen[3]; but cultivation using spades, digging sticks or hoes might have more often been women's tasks (Blackwood 1987; Goody 1976). Women may have tended garden or 'wild' plants in and around roundhouses and enclosures (q.v. Finerman and Sackett 2003; Hastorf 1991), and this work might have been especially important if cereal harvests failed. Such gendered roles are only assumptions and generalisations, however, and there are often exceptions to these. Women might often have performed the same tasks as men, especially if men were absent or had died (e.g. Fig. 4.18). There is also ethnographic evidence for 'nested tenure' with different gender, age and status groups having access to and control over different plants (Rocheleau and Edmunds 1997). All ages and genders might have been involved with harvesting, threshing and haystacking, but perhaps only those with more experience were responsible for coppicing or hedge laying. Weeding, bird scaring and stone gathering or clearance could have been carried out by even very young children. Gleaning from harvested fields might have been the provenance of the very young and very old.

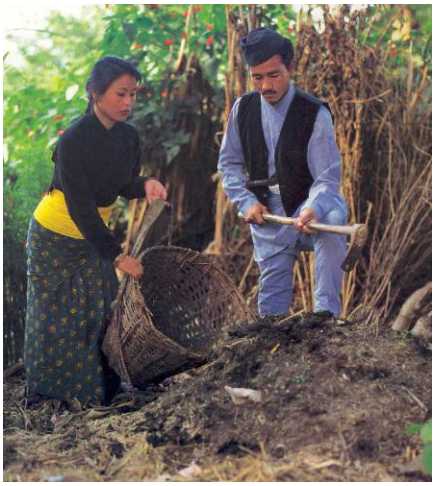

Figure 4.22. (top left). *Men using wooden spades to break up soil in the Kaugel valley, New Guinea. (Source: Steensberg 1980: 77).* **Fig. 4.23. (top right).** *Somba women winnowing grain, Dahomey, West Africa. (Source: Englebert 1973: 133).* **Fig. 4.24. (centre left).** *A Rai couple cultivating soil, Nepal. (Source: Mendell 2000: 85).* **Fig. 4.25. (centre right).** *Men, women and children digging fields in the Peruvian Andes. (Source: Scott-McNab 1994: 16).* **Fig. 4.26. (bottom).** *Giving winter feed to cattle in Okehampton, Devon, 1961. (Source: Ward 1991: 19).*

Conclusions

Some authors have claimed that after the Roman conquest what little local indigenous cultivation there had been in northern England was largely abandoned, and grain was instead imported from the south (Branigan 1984: 30; Seaward 1976: 22-23). This assertion now seems utterly untenable in light of the evidence for continued arable cultivation across northern England (Haselgrove 1984; Huntley and Stallibrass 1995; van der Veen 1992), including my study region. This was not necessarily either intensive or extensive production (cf. van der Veen and O'Connor 1998), but mostly for individual households and small communities, and perhaps allowing for a modest, tradable surplus.

Large-scale, centrally managed Roman arable 'estates' might be expected to have very regular, even centuriated field systems, with central storage and administrative centres. The agricultural enclosures and storage and administrative buildings associated with these hypothetical estates would be substantial in size and regular in form. There is some potential evidence for such Roman estates in the fenlands of East Anglia, at sites such as Stonea in Cambridgeshire (Jackson and Potter 1996, but see Taylor 2000 for a critique of such arguments). As I shall outline in Chapter 7, the presumed regularity of even the 'brickwork' fields is illusory, and there is simply *no* archaeological evidence for any centralised, regular centres. In the third and fourth centuries AD, more intensive and extensive agriculture does seem to have taken place within the study region, however, although it is still not clear if this was related to major increases in agricultural production, or changes in social factors such as land tenure (see Chapter 7).

Despite the limited evidence, probable cereal producer sites have been identified in West Yorkshire, South Yorkshire and Nottinghamshire. In some areas at least, crops must have been significant. For many settlements, these might have been small arable infields. In these, manure from byres and pens might have been spread onto the land, or more probably, animals were grazed on stubble after harvests and over winters. Some fields may have been rotated from arable to pasture, especially on poorer soils.

Animal husbandry would have been absolutely vital for the production of manure, either through rotation every few years, folding over the winter, and/or the addition of manure from middens and byres. If any extensification and intensification of arable agriculture did take place, it would have required a concomitant increase in the numbers of livestock that were kept (van der Veen and O'Connor 1998: 133).

Notes

1. An influential model developed by Martin Jones (M. Jones 1985, 1996) has dominated many of the interpretations about whether or not archaeobotanical assemblages indicate that a settlement was a 'producer' and/or a 'consumer' site, including many of the analyses from the study region. This is based upon the relative proportions of grains, chaff and weed seeds recovered in samples. This model has been criticised, however (Van der Veen 1992: 98; Van der Veen and Jones 2007: 420-421). In reality, many factors such as the nature of the archaeological context, and whether the cereal species were glume wheats (emmer or spelt) or free-threshing cereals (bread wheat or barley), would also have been important. In northern England in particular, methodological and preservational factors have probably created a bias against 'producer' sites.

   In this interpretation of the arable archaeology of the region, I have been necessarily reliant upon the analyses of the palaeo-environmental specialists, but I have tried to use their data in a qualified manner. Some very broad distinctions between different sites are thus possible to identify in some instances. Even in areas with more favourable palaeo-environmental preservation, the lack of *all* forms of evidence for cereal cultivation at some sites may suggest that such examples were predominantly pastoral. It is also clear, however, that cultivation *did* take place around many enclosure sites.

2. James Crowden. *Scything*. In J. Crowden (1991) *Blood, Earth and Medicine*. Parrett Press.

3. Helen Wickstead (forthcoming) has identified a clear androcentric historical trend in many past authors' accounts of the development of arable agriculture, with 'man' and technology driving ever-improving processes of land enclosure and the intensification of productivity. In these accounts the plough is firmly interpreted as male technology (Childe 1942; Engels 1884; Goody 1976), a tool for the mastery of feminised nature.