TREE REGENERATION IN COURT FIELD, NETTLECOMBE

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INTRODUCTION

When, in 1966, the Field Studies Council (FSC) negotiated a lease of Nettlecombe Court (TA4 4HT) from the Nettlecombe Estate to establish its ninth residential Field Centre, the only land included was the immediate garden and two tennis courts.

In the 1960s, the main requirement of a Field Centre was to provide a series of one-week residential field courses for students preparing to sit A-level examinations in Biology or Geography. Most of the biology tutors found it easier to interest their students in animals rather than plants, and in the invertebrates to be found in ponds and streams (or on the seashore) rather than those in grassland. It was certainly the opportunities offered by the former habitats that had encouraged me to apply for the post of Warden early in 1967.

On the other hand, Dr John Carthy, the newly appointed Scientific Director of the FSC, was keen to encourage an experimental approach in the field teaching of ecology (to augment the traditional observational recording) and had negotiated the inclusion of a small area of Court Field adjacent to the old croquet lawn within the lease. It was much easier to devise a worthwhile botanical experiment for that site than any zoological alternative. So most of the 'experimental plot' was given over to a long-term investigation into the effects of different mowing regimes on a previously uniform grassland sward. Sixteen small plots were marked out in a 4 x 4 Latin square in March 1968. It proved remarkably informative (Crothers 1991).

At the time when the Field Centre opened, in March 1968, the Nettlecombe Estate leased the grazing of its constituent fields, seasonally, to absentee tenants who 'farmed out' surplus livestock that did not require their regular personal attention. The Estate retained one man to keep an eye on that stock and to report any problems. Neither the Estate nor the tenants would allow FSC staff or students access to this land.

It was a rather silly situation; visiting groups who came to stay in this glorious rural setting were not allowed to study it – their fieldwork sites were almost always reached by coach or minibus! So when, in 1972, following the death of the Retainer, Nettlecombe Home Farm was again let as a single unit, FSC seized the opportunity to lease the rest of Court Field (Fig. 1).

The former management history of this land is well documented (see Rose and Wolseley 1984, for a précis). From the 18th century until the 1960s, it had been a deer park – established by drastic thinning of former woodland rather than by planting trees in open grassland. The estate map of 1796 (Rose and Wolseley 1984, fig. 3) shows it as part of the Great Park; by 1947 (Rose and Wolseley 1984, fig. 2) it was under rough pasture with considerable bracken. There had been few visible changes up to 1971 (apart from a natural 'thinning' of the oaks (f–f in Fig. 1) along the south-west boundary and the death of a large oak (?) north-west of the 'isolated oak' (Fig. 2), despite the fact that the deer had been shot and the land reclaimed for grazing in 1963.

When drawing up a management plan for Court Field, my primary objective was to create a variety of habitats within which we could compare and contrast their fauna and flora. The success of the Grassland Experiment in the Experimental Plot encouraged us to expand this concept onto a larger scale. Accordingly, in March 1972, the field was divided roughly in half by running a fence across at the narrowest point (Fig. 3). Grazing stock were subsequently excluded (for most of the time!) from the distant half, whilst the Home Farm tenant was invited to graze the area closer to the house (he needed to be able to move stock through it, anyway). We wanted the land grazed and there was never any suggestion that we might import 'foreign' livestock for the purpose; memories of the 1967-68 foot-and-mouth outbreak were still fresh in the mind.

Figure 1 illustrates Court Field, as seen from the first floor of Nettlecombe Court (four windows to the right of the one arrowed in Fig. 2) before the dividing fence was put in place. Apart from the surviving parkland trees, the vegetation was predominantly sown grassland, although bracken, brambles and nettles were beginning to recolonise.

West Somerset is not short of convenient streams in which to demonstrate the principles of hydrology but it is not easy to measure the discharge – the

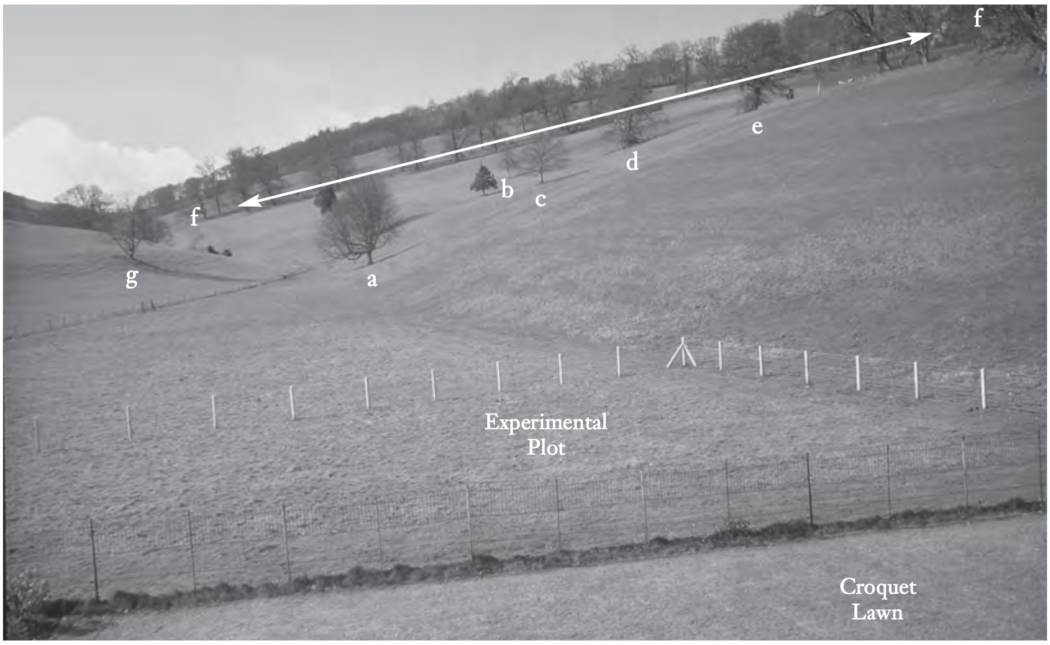

*Fig. 1 Court Field, 30 March 1968. Part of the former Nettlecombe Deer Park, the land had been reclaimed for agriculture in 1963. A selection of mature parkland trees had been retained including 'a' a sterile horse-chestnut (*Aesculus hippocastanum var. Beaumannii*), 'b' a red horse-chestnut* (A. carnea) *'c' a copper beech (*Fagus sylvatica f. purpurea*) 'd' a sweet chestnut (*Castanea sativa*) 'e' a large, isolated, sessile oak (*Quercus petraea*) and the whole backed by a line of sessile oaks 'f – f' left when Park Wood was felled in 1829 to form the field behind them. There are also several exotic conifers, thought to be Japanese red cedar* (Cryptomeria japonica). *A flowering cherry, grafted onto a wild cherry (*Prunus avium*) rootstock 'g' in the neighbouring field would prove important later*

volume of water flowing – down a natural stream channel. So, in the stock-excluded half of Court Field (to avoid accidents to sheep) FSC staff diverted Nettlecombe Water to flow through channels of rectangular cross section and arranged for the water to flow over a V-notch weir. Anyone interested in the resulting data should consult Howcroft (1977) or Howcroft and Willis (1987).

Construction of the V-notch weir rendered the public right of way impassable (if that Land Rover had not had a winch fitted it might still be there!) so a better alternative was constructed a little way above the valley floor (Figs 4, 5 and 6).

INITIAL CHANGES TO THE VEGETATION

The most obvious consequence following the erection of the fence (Fig. 3) was a rapid increase in the spread of bracken (*Pteridium aquilinum*). Figures 2, 3 and 4 record the state of the vegetation in the Spring of 1972; essentially grassland but with some dead fronds of last year's bracken evident, together with developing clumps of common nettle (*Urtica dioica*).

In Fig. 4, note the trunk of a young horse-chestnut (*Aesculus hippocastanum*), unfortunately directly in line with a fence post behind it. This, seemingly the only naturally regenerated young tree in the field, had been sadly disfigured (perhaps by a lightning strike) and we cut it back to a short pole.

Figure 5 shows the V-notch area in October 1972 when the 'scars' of human interference had begun to fade. Note that the proliferation of bracken upslope of the new track had not continued below it. I take this to mean that the spread of bracken had been vegetative, via rhizomes, and not germinative,

Fig. 2 March 1972.The V-notch weir is under construction across what had been the Public Right of Way. Apart from a mutilated young horse-chestnut (Aesculus hippocastanum) *that was, subsequently, cut back still further. There are no young trees growing in what will become "Cherry Corner"*

*Fig. 3 March 1972; a new fence divided Court Field in two. Note that the isolated sessile oak (*Quercus petraea*) has no associated saplings at this time. Both it and the tree whose stump is visible upslope are shown on various historic maps and photographs*

Fig. 4 Creating a new track around the V-notch weir, April 1972. It did cross my mind at the time, that it might have been better to bulldoze the track before erecting the gateposts!

by spores. It would seem that the track had formed an effective barrier to bracken rhizomes – for a surprisingly long time (Fig. 17). In that Figure the pollarded (fertile) horse-chestnut was thriving in the background to the right of the track.

COLONISATION BY TREES

In the first 40 years following erection of the fence across Court Field, three distinct patterns of colonisation and spreading were demonstrated by various different species of tree. I will illustrate these by describing the development of secondary woodland by sycamore (*Acer pseudoplatanus*), sessile oak (*Quercus petraea*) and wild cherry (*Prunus avium*). Other species demonstrate slight variations of the same patterns but less dramatically.

Rather obviously, tree colonisation is only possible if a supply of viable seed is present on site. Expressed more specifically, there must be one or more parent trees growing close enough to the site for the available distribution systems to deliver viable seeds. Subsequently, conditions must be suitable for germination and sufficient of the seedlings must survive competition from other plants and the herbivory of animals [the new fence had only excluded farm stock; deer, rabbits, squirrels, voles, slugs, snails, bugs, grasshoppers, caterpillars and company all continued to flourish] to grow to the sapling stage.

Acer pseudoplatanus

Sycamore flowers, in common with those of other maples, are insect pollinated but the resulting seeds are dispersed by the wind. In south-west England, the prevailing wind is from the south-west so one might expect that the majority of seeds would be transported north-east from their parent. However, wind direction is influenced by local topography (winds tend to blow up or down valleys) and so the orientation is not exact.

There are several mature sycamore trees growing further up the Nettlecombe valley to the south-west of the ‘bracken field’, as the stock-excluded half of Court Field was swiftly dubbed; but one, in particular, was seen as the putative parent of the nascent wood (Fig. 7). It was evident in 1981 (Fig. 12) that seeds had germinated most or all springs

Fig. 5 The V-notch area in October 1972. The new track had stabilised and had been welcomed by all users of the right of way (Well, nobody complained!) The area around the installation had been managed to facilitate student access and, elsewhere, bracken had thrived. The mature tree, top left, is a fertile horse-chestnut and the young individual arrowed might be one of its progeny

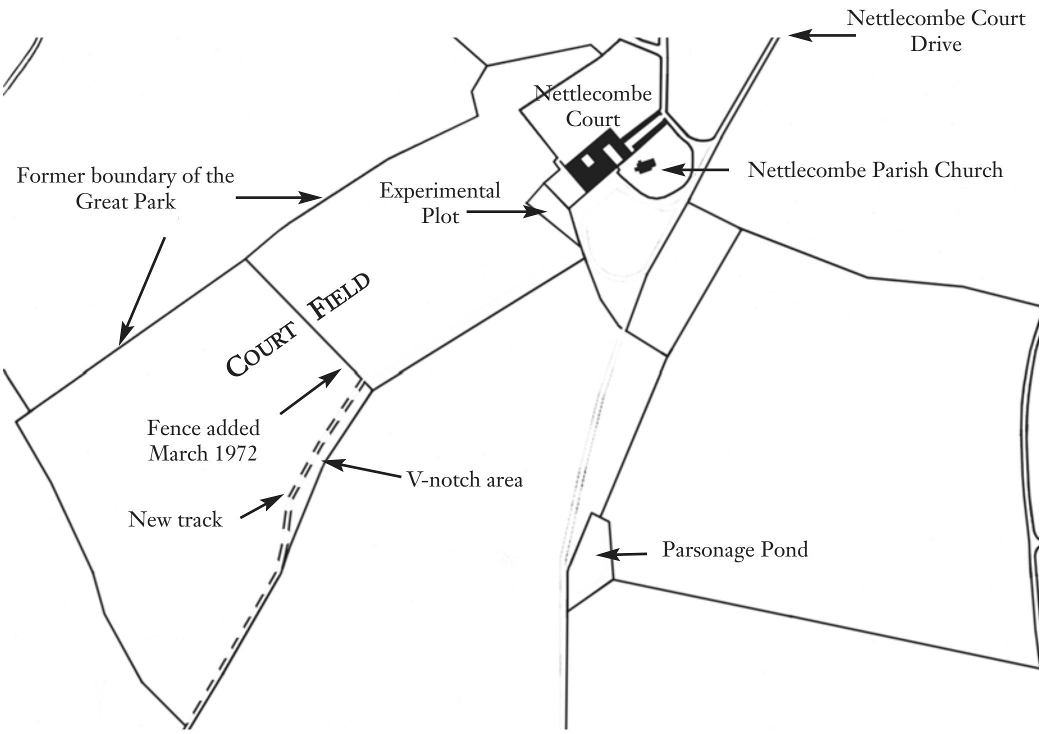

Fig. 6 An outline sketch map to show the relationship of Court Field to Nettlecombe Court and Church

Fig. 7 The site of a future sycamore wood, April 1972. The fence is in place and the first section of track bulldozed. A Landrover is waiting to go through the gate

for the previous ten years and that a dense mixed-aged single-species stand of sycamore was coming to dominate this part of the Field.

In the early 1980s it was not possible to walk between the saplings without touching them (Fig. 12). The mixed-age component of the developing wood can be clearly seen in Fig. 12 but, as time passed, this feature became less noticeable (e.g. Fig. 15) – and not simply because it became increasingly difficult to see the tops of the young trees. At the same time the density (the number of individuals per unit area) decreased. The simplest explanation for this process is intra-specific competition for light.

Once human management of the field had been curtailed (1971), the area of land destined to become a sycamore wood rapidly reverted to bracken (Fig. 8). But this did not prevent sycamore seeds from germinating or sycamore saplings from pushing up through dead bracken fronds (Figs 9 and 12). This was possible because sycamore comes into leaf many weeks before the new bracken fronds begin to cast a significant shadow.

Once the tree canopy had closed over the young wood, in the early 1990s, shortage of light on the woodland floor in summer killed off the bracken and prevented the growth of any more saplings (although not the germination of seeds) and accentuated the process of natural ‘thinning’ as the tallest trees shaded out the shorter ones.

Many saplings that had been bent over by the weight of dead and dying bracken fronds in the previous autumns had managed to survive (Fig. 10). But, as this phenomenon is much less evident in Figs 15 and 16, I assume that the grossly distorted saplings had been so retarded in growth that they became shaded out by their more fortunate siblings.

By 1986, a clear-cut northern (up-hill) boundary of the young wood was becoming apparent. A theory was proposed that the presence of the young wood prevented an adequate supply of seeds from being blown any further from the parent tree but that, once the young trees began producing seeds themselves the woodland margin would advance; but this has not happened.

Prior to 1988, I felt that any attempt to survey the developing wood would have imposed an unacceptable influence on its development but, in that year, I measured the 874 saplings growing within 120 m of the putative parent (Fig. 11).

Few trees grew within 15 m of the parent’s trunk, suggesting a *cordon sanitaire* (Fig. 13), but most of this area was under the canopy of the parent and outside Court Field; then came the track (Figs 8, 9, 16) that lies just inside the boundary fence. Otherwise, the pattern shown in Fig. 11A is much as would have been expected and probably reflects the decreasing quantity of air-borne seeds arriving

Fig. 8 The new track was extended around the north bank of Nettlecombe Water in 1974. In June of that year, one sycamore sapling (arrowed) had risen above the bracken that had colonised most of the slope

Fig. 9 May 1981 and the sycamores are colonising fast, growing up through the bracken. I assume that the tallest individual is the sapling arrowed in Fig. 8. The deadwood seen here beyond the fence must have fallen elsewhere in that field and had been dumped there by the farmer to further his management of the productive area. This is an SSSI for timber beetles

Fig. 10 March 1997 and the sycamore wood had shaded out the bracken (elsewhere, bluebells had arrived) but the stems of the young trees record how, and how often, they had been held down by dead bracken. The strange (arrowed) 'prop-root' from the near-centre sycamore was the original lead shoot, bowed down over and over again until a fresh shoot grew from the rootstock once the bracken had been suppressed

at increasing distances from the parent. No *cordon sanitaire* was noticeable in 2007 (Fig. 16) as, by then, the canopy of the closest saplings interleaved with that of their parent.

Measuring trunk girth at breast height (gbh) is a standard forestry technique for assessing the volume of timber in a stand. This height is usually below the first branch and above the swelling at the base of the trunk. I tried to stand with the slope (one foot higher than the other) when taking the measurement.

I interpret the differences between Figs 11A and 11B to indicate the influence of intra-specific competition; the high sapling density in the 15-29 m ring seems to have inhibited optimal growth.

Figure 14 displays the same data plotted against

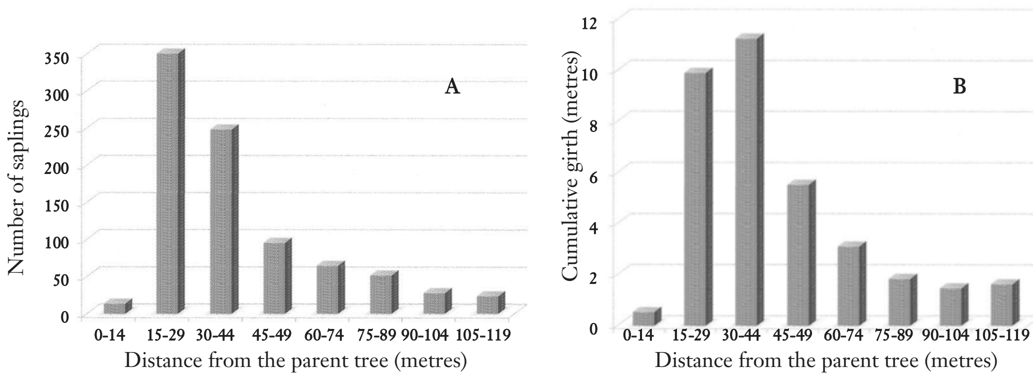

Fig. 11 Sycamore saplings versus their distance from their putative parent tree in 1988. A. The number of young trees present and, B, their total girth at breast height (measured in millimetres)

Fig. 12 Sycamore seedlings germinated freely every spring. Inset, individuals growing their first leaves above their cotyledons. In May 1981 (main photo) a dense mixed-age population of Acer pseudoplatanus *was beginning to dominate the bracken and bramble understorey*

Fig. 13 The apparent cordon sanitaire *between the putative parent sycamore and its progeny in 1986. The track runs from right to left just the other side of that fence – the Court Field boundary*

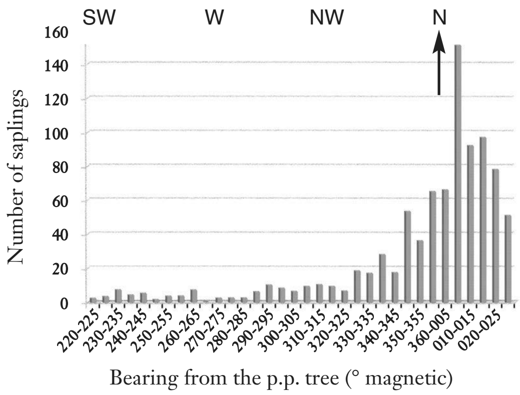

Fig. 14 The number of sycamore saplings versus their position in relation to the putative parent tree in 1988. It is unlikely that many individuals in the 'tail' of the distribution, derived from the putative parent of the main clump

the compass bearing of the sapling as seen from the parent tree (although the bearings recorded were those of the parent as seen from the sapling). The young wood has developed most strongly in the arc between north and north-north-east (360° – 022.5°), rather than true north-east as might have been expected. (A bearing of 045° from the putative parent falls outside the stock-excluded area of Court Field so any seedlings germinating from seeds that landed along that line would not have survived.) The gbh equivalent of Fig. 14 was so similar that it was not worth including.

I repeated the survey of young sycamores in 1991 with essentially the same result; there were slightly fewer individuals and most had grown larger. Alas, I have been physically incapable of doing this again.

Surprisingly, the boundaries of the wood that developed in the 1970s have expanded very little ('a' in Fig. 18), but scattered individual sycamores have appeared further away and upslope from the original parent ('b' in Fig. 18). I find it difficult to account for the apparent gap between areas 'a' and 'b' if the latter saplings grew from the original parent tree's seeds. It seems more likely that area 'b' represents a secondary colonisation from new parent(s) possibly growing close to the track in the bottom corner of area 'b' (Fig. 17).

Many of the young sycamores growing in area 'c' probably derived from other parent trees. Although a few will, doubtless, have grown from seeds dispersed from the same tree as produced

Fig. 15 April 1987; bracken still dominated the ground layer vegetation. The white arrows indicate the same tree in both this figure and Fig. 16

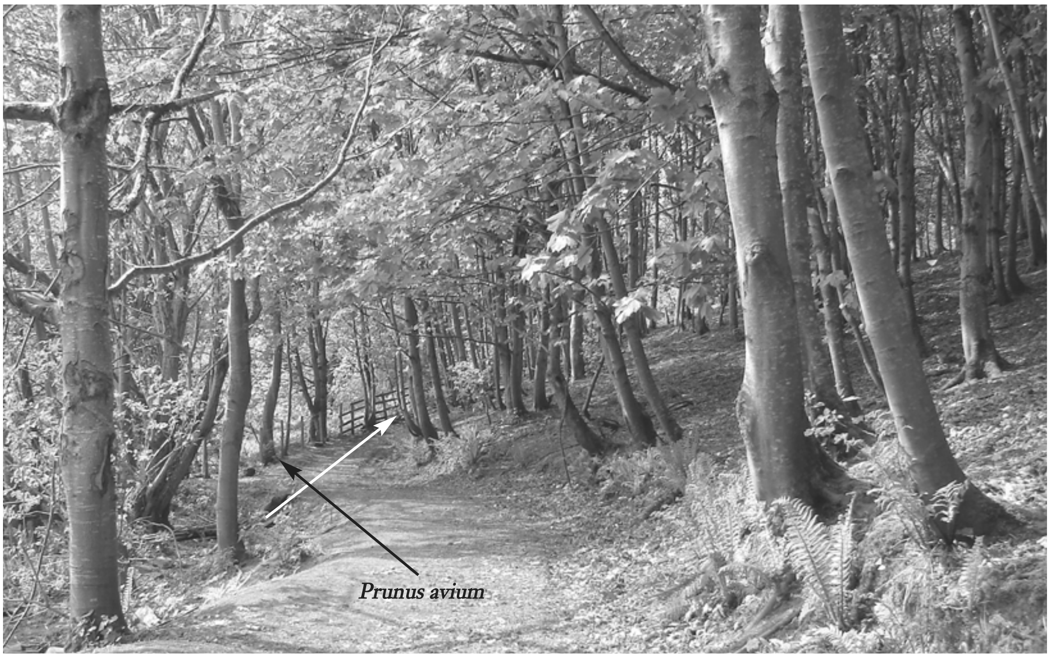

Fig. 16 28 April 2007; the tree canopy has closed and bracken has been shaded out. The white arrows indicate the same tree in both Fig. 15 and this figure

*Fig. 17 The stretch of track illustrated in Fig. 5, 37 years later, in April 2009. It is the same gate. The tree in the foreground is a bracken-bent sycamore. Many of the others are wild cherries but the pale leaves are of a planted red oak (*Quercus rubra*)*

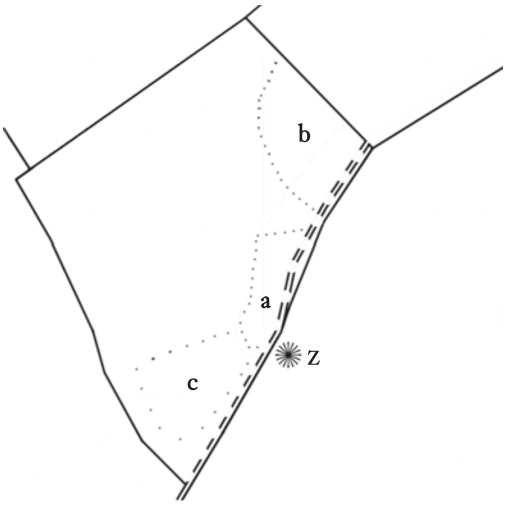

Fig. 18 A sketch map (based on Fig. 6) to summarise the main groupings of young sycamores in Court Field. The initial colonisation from the putative parent tree (Z) was concentrated in area 'a' but a few others appeared on the bank above the track by the V-notch weir (Fig. 5) and these were probably the source of seeds for the subsequent colonisation of area 'b'. Most parents of the saplings in area 'c' are probably positioned off the bottom left of this map

group 'a' – the wind does not always blow from the south-west in autumn – but most probably originate from parents growing along the banks of the stream further up the valley (off the bottom left of Fig. 18.)

I was surprised to see a line of sycamore saplings along the fence that runs almost due south-west from the putative parent. Saplings appearing along a fence line usually suggest bird dispersal; just because the text books all say that sycamore seeds are dispersed by the wind, that doesn't prevent birds from picking up those they find lying on the ground. The presence of the fence may also have created vortices that 'attracted' wind-borne seeds to fall to the ground on its lee side.

Quercus petraea

Sessile oak is generally assumed to be the native oak of western Britain. The flowers are wind-pollinated and the acorns are distributed by various animals or simply by gravity.

Nettlecombe Great Park was landscaped by Thomas Veitch (of Exeter), in the manner of 'Capability' Brown, in 1792, by drastically thinning most of the other trees that had been growing there. Rose and Wolseley (1984) demonstrated this by recording (on the now-isolated standard trees) lichen communities that only develop on the trunks of trees in woodland – and by measuring the girths of a sample of 69 Nettlecombe parkland oak trees. Their size strongly suggested their presence before 1792.

In 1972, oaks in the newly-exclosed area of Court Field comprised a large isolated individual (Fig. 3) and an irregular strip of trees running down the western boundary of the Field, left when the rest of Park Wood was felled in 1829 (Rose and Wolseley 1984). The isolated individual tree is marked on the Nettlecombe Estate map of 1796 and on the Ordnance Survey map of 1886.

Within a few years, a crescent of oak saplings appeared (Fig. 19), downhill from the presumed parent and outside its canopy. Table 1 shows the distances of these young trees from and the (magnetic) compass bearings to the parent. It is not considered that the compass bearings are, themselves, of any significance but this information (a) shows them all to be downhill from the parent and (b) should enable the individuals to be identified in future. The canopy of the parent oak extended 11 metres from the trunk, on the downhill side, in February 1987.

Oak trees do not grow in winter so the November 1994 data in Table 1 may be read as equivalent to January or February 1995 and the three datasets taken to be four years apart. Mean increases in gbh show that the young trees grew at a 'constant' rate (I make no claim to have measured each sapling at exactly the same point on each occasion), and the fact that the mean percentage increase in girth dropped in the later period merely reflects the increase in the initial girth.

It is not possible to determine whether this distribution of saplings arose as a result of bird distribution or simply by gravity, but it seems likely that the greater the distance from the mature tree the greater the probability that a bird was involved.

There is no doubt that birds carry acorns around. When my wife was elected Churchwarden, in 1975, I suddenly developed a hitherto unexpected interest in cleaning Nettlecombe church tower and was amazed to find hundreds of acorns (and conkers) on the roof. Only birds could have taken them up there. There is also a 'self-seeded' oak growing beside the copper beech (*Fagus sylvatica* f. *purpurea*) across the lawn from Nettlecombe Court. It was at the edge of the canopy when it germinated.

Fig. 19 The 'isolated oak' of Fig. 3 had, by October 1997, developed a 'skirt' of saplings on her downhill side

TABLE 1 – DISTRIBUTION AND INITIAL GROWTH OF THE SELF-SEEDED OAK SAPLINGS BY THE ISOLATED PARENT TREE

Bearing (°mag) of the parent	Distance (m) to the parent	Feb. 1987 girth (cm)	Jan. 1991 girth (cm)	Nov. 1994 girth (cm)	increase in girth 87-91	increase in girth 91-94	% increase in girth 87-91	% increase in girth 91-94
274	32.40	40.0	59.0	71.0	19.0	12.0	47.5	20.3
297	13.18	26.0	41.4	53.0	15.4	11.6	59.2	28.0
311	12.07	25.0	43.8	64.0	18.8	20.2	75.2	46.1
324	23.32	50.0	78.0	111.0	28.0	33.0	56.0	42.3
328	104.50	8.0	11.9	16.0	3.9	4.1	48.8	34.5
330	100.00	37.0	55.4	77.0	18.4	21.6	49.7	39.0
332	69.20	23.0	45.6	65.0	22.6	19.4	98.3	42.5
334	68.80	23.0	40.5	70.0	17.5	29.5	76.1	72.8
342	21.42	30.0	44.4	61.0	14.4	16.6	48.0	37.4
343	20.27	10.0	15.4	17.0	5.4	1.6	54.0	10.4
343	13.30	45.0	74.0	99.0	29.0	25.0	64.4	33.8
346	20.40			31.0		31.0		100.0
349	22.60	59.0	82.6	103.0	23.6	20.4	40.0	24.7
354	19.18	27.0	45.4	63.0	18.4	17.6	68.1	38.8
001	22.70	38.0	54.0	71.0	16.0	17.0	42.1	31.5
001	22.63	33.0	48.0	69.0	15.0	21.0	45.5	43.8
006	84.70	52.0	78.0	103.0	26.0	25.0	50.0	32.1
047	87.50	13.0	24.5	64.0	11.5	39.5	88.5	161.2
060	16.73	54.0	89.0	104.0	35.5	14.4	64.8	16.9
Means		68.0	106.5	146.4	38.3	39.9	56.1	37.5

Fig. 20 Two oak saplings (arrowed) form part of the 'skirt' around a copper beech (October 1997) with, inset, the position of the copper beech in relation to the isolated sessile oak (1990)

There is no doubt that birds have been involved with acorn dispersal in Court Field too, as there are young oak trees growing just outside the canopy, and downhill of, the mature copper beech, a little further down the slope (Fig. 20). Thus, whilst it is probable that the saplings listed in Table 1 derived from acorns from the tree they are growing beside, some could have been brought from elsewhere.

The birds involved were most probably corvids, especially rooks (*Corvus frugilegus*) and jackdaws (*Corvus monedula*). A mixed flock of rooks and jackdaws commonly visited Nettlecombe oaks each autumn; too heavy to perch on the peripheral twigs, they would fly in close, grabbing the fruits (and bits of twig) in passing. Many then landed out on the open grassland to eat their trophies; oak seedlings regularly appeared in the Experimental Plot.

Jays (*Garrulus glandarius*) and grey squirrels (*Sciurus carolinensis*) are also responsible for hoarding acorns in other places; but these are woodland species and not usually attracted to isolated trees (think of Figs 1-3; not 19 and 20!). And, even if I am wrong about that, I cannot imagine why a Grey Squirrel should only take its trophies downhill in order to bury them.

Young oaks rarely, if ever, grow under the canopy of mature oak trees for one or all of three reasons – shading, herbivory and chemical warfare. The very large number of thick leaves on a mature oak ensures that little light reaches the ground under the canopy. The 'looper' caterpillars of the winter moth (*Operophtera brumata*) avoid the toxic effect of oak tannins by feeding on the very young, growing, leaves, and falling down to pupate underground before the leaves 'mature'. The adult moths emerge in winter, hence their name, when the wingless females climb to the uppermost bud of the first oak plant (in this case) that they encounter. The winged males fertilise all the females they can find and those females then lay eggs on all the oak buds available to them. As most *O. brumata* caterpillars pupate under the canopy of the tree upon which they had been feeding, there is an almost zero chance of any sapling surviving there. And, if this wasn't enough, tree roots exude growth inhibitors to discourage competition; such inhibition being strongest towards close relatives.

None of this explains why all the young oaks lie downslope (or approximately south) of their presumed parent (Table 1). Pollen from other sessile

Fig. 21 The band of mature sessile oaks running down the western boundary of Court Field, Spring 1989. It would seem likely that the sapling with a rounded crown is related to the mature tree with the same growth form

oaks would most likely arrive from the south and west. So it could be argued that those flowers on the south and west sides of the tree were the most likely to be cross-pollinated and so to produce fruit. I have no evidence with which to substantiate that theory.

Presumably, the branches on the southern side of the tree experience warmer air temperatures, and more light, than do those on the northern side. Does that enable them to grow larger acorns?; or to produce them more quickly so that they fall before the full suite of acorn predators have tuned-in to this fresh source of food? I don't know.

An acorn falling from a considerable height would be likely to bounce and next make contact with the ground downhill from its first point of impact. Acorns falling from the uphill side of the parent would thus tend to bounce in under the canopy whilst those falling from the downhill side would tend to bounce away.

There were no trees (of any species) lying anywhere close to the north side of the isolated oak. Do rooks and jackdaws prefer to feed on the side of a tree closest to other trees that might offer perches? Again, I don't know.

All my observations of corvids snatching acorns from oaks happened to be from downhill and from the south. Do they find it easier to see the acorns in the brighter light?

Young oaks have also appeared beside the mature oaks growing along the western border of Court Field (Fig. 21). It is not usually possible to ascribe progeny to individual parents with any probability of being correct except in the case of one individual with a rounded crown. Note that all the natural regeneration of oak occurred outside the 'overall canopy' of the former strip of mature trees; none was under that canopy when it was a seedling.

In the mid-1980s the Nettlecombe Estate embarked on a replanting programme intended to ensure continuity of the Parkland oaks (and of their timber beetles – for which the Park had just been notified as a Site of Special Scientific Interest (Rose and Wolseley 1984)). Saplings grown from Nettlecombe acorns were planted within the 'strip', although outside the canopy of any living tree. The 'white stakes' visible in Fig. 21 are plastic tree

Fig. 22 The parent cherry tree, labelled in Figs 1 and 4, in flower. A branch of the flowering cherry cultivar (centre top) is surrounded by flowers of the Prunus avium *rootstock. One, or more, of its progeny is (are) coming into flower in the background (arrowed)*

guards placed around some of those saplings. I do not know whether any survived, whether those that died perished because of any residual growth inhibition from the roots of the original trees, or because they were smothered by bracken growing within their plastic tree guards.

Not all the young oaks growing in Court Field regenerated naturally. In 1974, I attempted to establish a teaching resource in the small area between the new track and the boundary fence which, I hoped, would enable students to compare the ground flora that developed under pines with that which appeared under oaks. Just upstream of the V-notch, I planted a group of pines (Fig. 23) and, beyond them, a mixed group of native and red oaks (*Quercus rubra*) all of which had been given to me. (Another two red oaks were planted downstream of the V-notch, one of which is visible in Fig. 17.) I should have known better; nothing at all grew under the pines and, as there is no need to measure anything or apply statistics to appreciate the difference between something and nothing, the pines were removed, but the mixed oaks remain.

Morris and Perring (1974) provides as excellent resource on oak-life generally.

Prunus avium

Wild Cherry is a species of rich soil or of clay over chalk or limestone (Wilkinson 1981) and is unlikely to be native to this valley with its poor soil overlying Devonian (Old Red Sandstone) shillet, although there are outcrops of Devonian limestone and the water in Nettlecombe Water averages pH 7.0.

It is, perhaps, the easiest species to study, being the only white-flowered tree present in Court Field and all the individuals now present ultimately derive from a single parent (no longer extant).

The tree in question – labelled ‘g’ in Fig. 1 – had been planted as a showy ‘flowering cherry’ (Fig. 22) in full view from the west-facing windows of Nettlecombe Court. Like all such sterile cultivars, it had been propagated by grafting a scion onto a vigorous wild cherry rootstock – in this case, that of a gean or mazzard (*Prunus avium*).

If it is desired to perpetuate a cultivar, it is

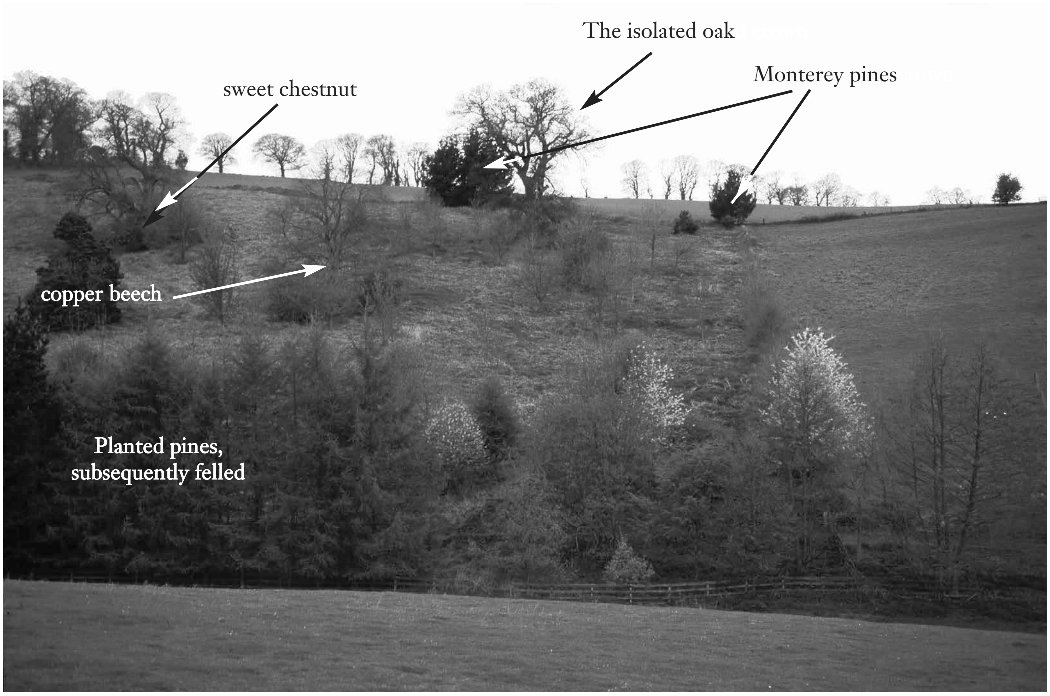

Fig. 23 Cherry Corner in April 1992. Seven young cherries survived germination and sapling pangs and grew to become young trees in this corner of Court Field. From this viewpoint, they appear as three clumps

necessary to remove any shoots that appear on the rootstock. This was not done for this tree and by 1971 the rootstock had grown up around the graft. By 1989 (Fig. 22) fertile flowers of *P. avium* far outnumbered those of the infertile cultivar.

Flowers of the wild cherry are pollinated by insects (mainly bees) and the seeds are dispersed away from the parent by birds. So the distribution of the first filial (f1) generation of cherry saplings is dependent upon bird behaviour.

The closest f1 sapling (Fig. 22) is 59 m from the parent (measured with a tape laid across the ground surface) – the nearest area of land protected from grazing by farm livestock. Despite a well-argued hypothesis that a hard, barely ripe, cherry, falling from the topmost branch of the parent, could, under favourable conditions, have travelled that far under gravity alone, the general consensus has always favoured an avian vector.

Many small passerine birds (mostly finches and thrushes) were attracted to the carpet of ripe cherries lying on the ground under the parent tree, pecking away the edible flesh and leaving the stone behind. Much avian time was wasted in 'discussions' concerning which bird had the right to peck at which fruit and it is possible that the more experienced individuals avoided most of the conflict by snatching a cherry and taking it away to eat in peace before returning for another. Sparrowhawks (*Accipiter nisus*) were attracted to the flock and this, too, will have encouraged some individuals to make only short visits to the banquet.

According to Witherby *et al.* (1940), at least nine British bird species have been recorded as feeding on cherries. But I suspect that the appearance of the pioneer saplings in Court Field can be attributed mainly to Blackbirds (*Turdus merula*). This would agree with the findings of Snow and Snow (1988), who observed that blackbirds were the predominant avian consumers of wild cherry fruits in their study area in south-east England.

Seven sapling cherries became established (very quickly) in the easternmost corner of Court Field, beside the partition fence and just upslope from the track (Fig. 23). The two largest individuals are so

Fig. 24 A wild cherry at the edge of the sycamore wood with the remains of the bramble clump in which the vector bird perched. The path was made by the numerous students I took to see this tree

close to fence posts that I presume the bird must have perched on them. Once those seven began to flower and produce viable seed, it was impossible to tell for certain whether the many new shoots in 'Cherry Corner' represented additional seedlings from the original parent, seedling growth from the pioneers or suckers from their roots.

Comparatively few native trees spread by suckering but cherries and some poplars, including white poplar (*Populus alba*), are notable examples. Rackham (2006) noted that *P. avium* spreads twice as freely by suckering as it does by seed and I have no reason to doubt that assertion. Tell-tale signs indicating suckering, as distinct from germinating, include lines of shoots radiating out from the trunk – especially when some of these continue the general direction of a root visible on the surface of the ground – and sapling growth within the canopy of a mature tree.

Three young trees are considerably further away from the original parent. One grew from a cherry that was dropped by a bird visiting the horse-chestnut upslope from the V-notch weir (and was alive and well in 2014 despite the fall of the horse-chestnut); the second (arrowed in Fig. 16) was dropped by a bird sitting on the boundary fence, in the *cordon sanitaire* between the parent sycamore and its progeny; whilst the third is at the top edge of the sycamore wood (Fig. 24).

The bird that dropped this third cherry perched in a bramble bush. When first recognised as *P. avium*, it seemed possible that the bramble might shade out the cherry, but as time passed the tree came to dominate and soon the reason for its presence at this spot will have disappeared.

Whilst the parent cherry remained alive in the adjacent field, the reason for the cluster of young trees in 'Cherry Corner' was easily explicable to anybody when all were in flower (Fig. 26). However, it blew over during the mid-2000s and has subsequently been removed. This event provided one stimulus to write this paper.

Other species

In Court Field, sycamore, sessile oak and wild cherry provide the best examples of the three commonest patterns of tree regeneration. Other species also show the same patterns but not as clearly, either because fewer seeds arrived (parent too far away?) or because of a much lower germination rate.

Thus, only a few ash (*Fraxinus excelsior*) have

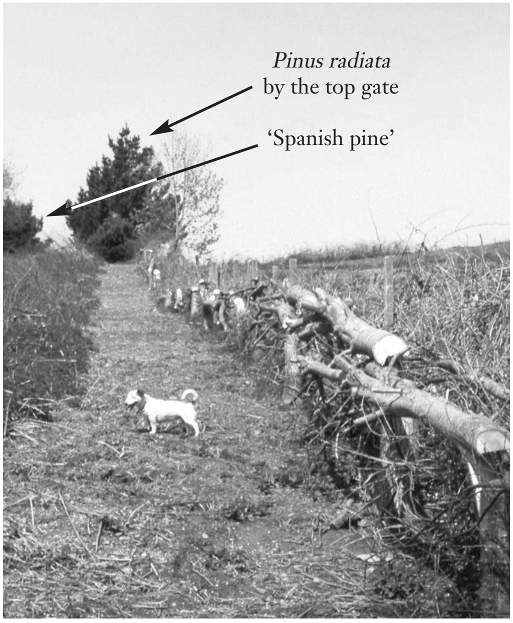

Fig. 25 The hedge, planted to reinforce the original fence (Fig. 3) when it had just been layered for the first time, 26 April 1994

appeared; one in the middle of the sycamore wood. The large, originally isolated, sweet chestnut (*Castanea sativa*), labelled 'e' in Fig. 1, developed a 'skirt' of progeny downslope and at the edge of its canopy in a manner similar to the isolated oak. There are far fewer young trees but they have grown more vigorously than the oaks. The red horse-chestnut (*Aesculus carnea*), labelled 'b' in Fig. 1, had a single sapling growing just outside its canopy in 1999.

A number of young rowans (*Sorbus aucuparia*) have appeared but I have no idea where the parent(s) may be growing. Their fruit has been recorded in the diet of various birds and mammals but appears to be especially palatable to thrushes and Starlings (Snow and Snow 1988). In Court Field the distribution of young trees is consistent with bird dispersal via faeces – along a fence line, in bramble thickets, and at the edge of tree canopies (including the copper beech). Elder (*Sambucus nigra*) shows a similar distribution but is especially common under the canopy of mature trees. I remain surprised at the absence of holly (*Ilex aquifolium*) and blackthorn (*Prunus spinosa*) which colonise readily elsewhere in the parish.

Plantings

Alas, not all the young trees now growing in Court Field appeared naturally. I have already mentioned the pines (now removed) and oaks planted between the track and the stream. There are some other pines at the top of the field (Fig. 25). The tree beside the top gate, and the small group beside the top path, are Monterey pines (*Pinus radiata*) planted in the autumn of 1973; they came originally from a nursery at Little Milford, Pembrokeshire. I am not sure what the other pines are, between the top gate and the isolated oak, as I grew them from seed collected in southern Spain during 1979. In the autumn of 1973, I also planted a group of alders (*Alnus glutinosa*) beside my newly dug stream channel, and beside the new fence below the gate (Fig. 26).

Had we appreciated how tall the bracken would grow or what great stresses the mass of wet collapsed fronds would impose on the fence erected in March 1972, we would have gone for post and rails. As it was, in the late 1970s, I planted a hedge to reinforce it. Always wishing to create a variety of habitats, I planted oak saplings in the lower section, beech (*Fagus sylvatica*) in the middle section and hawthorn (*Crataegus monogyna*) at the top. The oak saplings took well (Fig. 25), beech less so and the hawthorn so badly that it was replanted in 1999.

DISCUSSION

When, in 1971, I decided to run a fence across Court Field and exclude farm livestock from the western half, I had expected that trees would recolonise. But I had not anticipated that recolonisation would be so rapid in the lower part of the field or so slow in the upper which, at the time of writing, remains dominated by bracken.

I offer two, different, observations to account for this situation. The obvious point is that trees can only grow in places to which their seeds are distributed. So it might be argued that the absence of young trees from the upper (western) sector of the field was due to the absence of seed-delivery systems; but there was no shortage of bramble patches. One presumes that birds introduced the brambles – so why had they not brought the trees?

The second observation relates to the density of the bracken population. Up to and including 1970, bracken had been prevented from encroaching significantly into the grassland (Fig. 1) by a

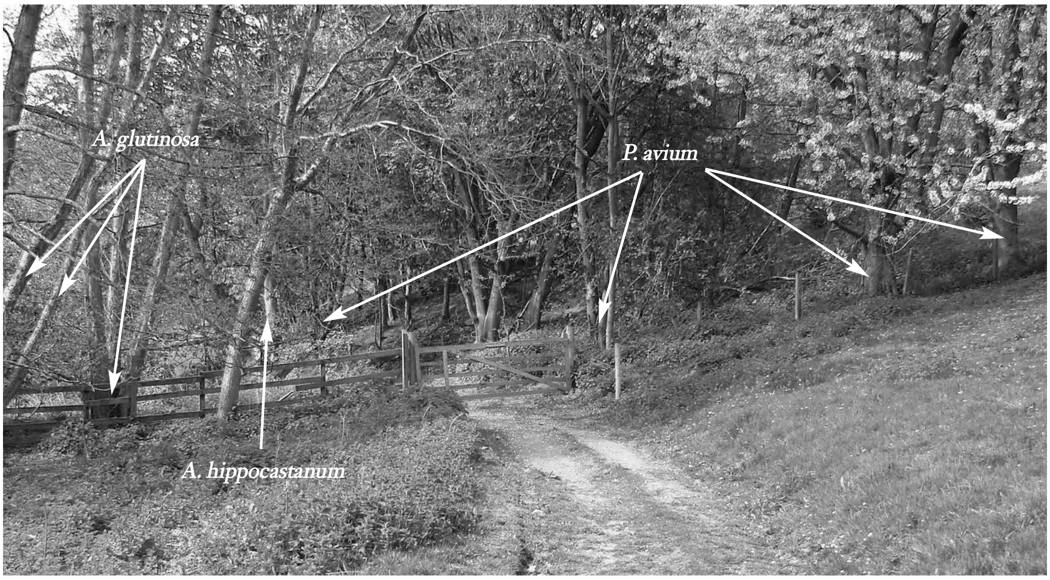

Fig. 26 The gate into Court Field in April 2009. Compare with Figs 3, 4 and 5. Almost all the grass has disappeared from the stock-excluded land (except around the V-notch site where it is mown) and the bracken that colonised so vigorously in 1972 has vanished from under the trees. The alders (Alnus glutinosa) *were planted in 1973 and the cherries* (Prunus avium) *look older than their 37 years. The horse-chestnut* (Aesculus hippocastanum) *was the only tree present when Figs 4 and 5 were taken*

combination of grazing and mowing. In 1971, the grazing of Court Field was not let and the Nettlecombe Estate did not mow the field. Dead bracken fronds are conspicuous in Figs 2-4 but they were well-spaced individual fronds, much more noticeable in death than in life; grasses had predominated the previous summer. Bracken presented little constraint to tree regeneration in the early 1970s. The same cannot be said for later decades, and where not inhibited by tree cover, the bracken grew tall and dense. This may be the main reason for the much slower recolonisation of the upper sector of Court Field.

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