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The first farmers of the Northwest European Plain: some remarks on their crops, crop cultivation and impact on the environment

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ABSTRACT

Inhabitants of the Northwest European Plain were rather late in adopting crop cultivation. Most of their crop plants were originally domesticated in the Near East, but on the way to northwestern Europe three of the original founder crops were lost: chickpea, bitter vetch, and lentil. Surprisingly, one plant was added: opium poppy. Another new plant, rye-brome, just missed out becoming established as a true crop. The final adoption of crop cultivation may have been facilitated by the appearance of summer varieties of the cereals grown. Whether the fields were the short-lived fields connected with a slash-and-burn technique or longer-lived is open to debate, but the effect of agriculture was that the landscape became more open, sufficiently open to allow the use of the ard and the wagon.

1. The Neolithic founder crops and what was left of them

At the very beginning there were eight founder crops, the eight crops of early Near-Eastern Neolithic agriculture: emmer and einkorn wheat, barley, pea, lentil, chickpea, bitter vetch, and flax (*Triticum dicoccum* Schübl., *Triticum monococcum* L., *Hordeum vulgare* L., *Pisum sativum* L., *Lens culinaris* Medik., *Cicer arietinum* L., *Vicia ervilia* (L.) Willd., *Linum usitatissimum* L.) (Zohary and Hopf, 2000, pp. 241–242). By 8000 cal BC all of these had been successfully domesticated. In the seventh millennium BC the free-threshing durum-wheat (*Triticum durum* Desf.) made its appearance and still later another free-threshing wheat was added, namely bread wheat (*Triticum aestivum* L.). In the following the two free-threshing wheats will be lumped together as their grains cannot be distinguished archaeobotanically, though their chaff can, but this is not found as often as grain. Once agriculture was established in the Near East, crop cultivation spread to, amongst other regions, temperate Europe (Zohary and Hopf, 2000).

By 5500 cal BC food production was common practice in Hungary, the birthplace of the Linearbandkeramik culture (LBK), a culture which expanded rapidly all over Central Europe north of the Alps. The LBK restricted its activities, more or less, to the Central European loess belt and at the northern limit of this belt, around 5000–4900 cal BC, the expansion stopped (Lüning, 2000). Some 900 years passed before the inhabitants of the Northwest European Plain adopted the new way of life. By the Northwest European Plain is understood the western part of the geomorphological region in Europe that consists of the low plains between the central European Highlands to the south and the North Sea and the Baltic Sea to the north. Why did the process not continue smoothly?

Many reasons have been put forward, one of which is that the crop plants, with their origin in the Near East, had not, or not yet, adapted to the climate prevailing on the Northwest European Plain. Indeed, some of the founder crops got 'lost' during the expansion of agriculture.

Chickpea and bitter vetch never reached the LBK fields. The disappearance of chickpea may safely be attributed to its climatic demands. In the case of bitter vetch this is less likely, because the crop was cultivated from 1100 cal BC onwards on the Central European loess, and this at a time when the climate was definitively not more agreeable with this vetch than before. Its initial loss may perhaps be attributed to the use of the plant, as this pulse is toxic to humans and had to be leached in water to allow consumption (Bakels, 2009, p. 103). It may be that this kind of treatment did not fit in with the LBK habits of food processing.

Lentil disappears from the LBK records in the northwestern part of the region occupied by this culture after the first phases of habitation, most probably due to a climatic decline (Schmidt and Gruhle, 2005). The plant is warmth-loving and had already reached its northern limit (Bakels, 2007). But even after the loss of

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three founder crops, six remained, though the free-threshing wheat became unimportant, and their number was increased by the addition of one or two new crop plants.

One of the additions is opium poppy (*Papaver somniferum* L. var. *setigerum*) which the western branch of the LBK picked up somewhere, possibly through contacts with the Western Mediterranean basin (Bakels, 1982). The LBK farmers may have been the first to cultivate this plant (Salavert, 2011). The other is rye-brome (*Bromus secalinus* L.). This grass has an origin in southeastern Europe and was a member of the suite of weeds that arrived together with the crops (Kreuz, 1990, p. 148). Somehow rye-brome seems to have obtained a status of its own and was reaped as if it were a crop, a supposition already made by Knörzer (1967). Somewhere in the past oats and rye did start in a similar way (see Zohary and Hopf, 2000), but they made it into true crops, which rye-brome did not. It is a failed crop plant (Fig. 1).

Most rye-brome lots are reported from the northwestern part of the vast region occupied by LBK farmers. Why did they consider this grass a welcome addition to their common produce? Perhaps this was because traditional crops failed, not always but occasionally. This may also be the reason that the sites of LBK farmers in western Belgium, at the western frontier of LBK occupation, reveal many more remains of fruits and nuts collected from wild stands than mainstream Central European sites (Salavert, 2011).

Lack of social and economic motives for abandoning their way of life may have been the main reasons for the hunter-gatherers living north of the LBK farmers to continue their own traditional ways, but a minor hindrance may have been the nature of the crop plants, especially the cereals, as they furnish the staple foods for winter survival.

Cereals come as autumn- (or winter-)varieties and spring-(summer-)varieties. Autumn-sown varieties survive the winter above ground as short green plants, shoot in spring and bear grain in summer. It is a trait going back to their wild ancestors. Originally cereals were sown in autumn. But spring-sown grain exists as well. It completes its lifecycle during spring and summer, independent of any adverse conditions that bad winters may bring. At some indefinite time in the past such varieties developed from autumn-sown varieties. At present there is a debate going on whether LBK farmers practised autumn- or spring-sowing with respect to their cereals. Bogaard (2004), amongst others, came to the conclusion that they were autumn-sown. Kreuz and Schäfer (2011) are advocates of spring-sowing. Such judgments are based on the analysis of arable weeds found together with the crops. Winter-annuals indicate autumn-sowing, summer-annuals spring-sowing. Everybody agrees that the pulses and oil plants were in general spring-sown (Körber-Grohne, 1987).

Fig. 1. Rye-brome (*Bromus secalinus*). Photo De Godin.

An initial absence of spring-sown varieties of cereals may have delayed the expansion to the north of cereal growing and with it all crop cultivation, and if LBK farmers knew only winter cereals this may partly explain the temporary halt (Kalis, pers. comm.). In the colder north and in the wetlands of the Northwest, for instance the Rhine–Meuse delta, autumn-sowing may have been risky.

According to Bonsall et al. (2002) northwest Europe experienced a climate change around 4000 cal BC associated with drier conditions and an increase in the annual temperature range, which would have been good for promoting crop cultivation. The appearance of spring-sown varieties may have been an additional trigger for the expansion of agriculture into the Northwest European Plain.

Anyhow, the seven (six + one) remaining crop plants, emmer wheat, einkorn wheat, free-threshing wheat, barley, pea, flax/linseed and poppy were in the end cultivated in the region beyond the loess belt (Kirleis et al., 2012; Out, 2009) Even rye-brome is found there, witness a carbonized lot retrieved from Hazendonk (phase 1), a site in the Rhine–Meuse delta area, dated 4000 cal BC and belonging to the Swifterbant culture (Bakels, 1981; Out, 2009, p. 48 and 65). Pea, flax/linseed and poppy are not found very often and free-threshing wheat is also uncommon. Einkorn wheat too seems to have been rare. Emmer wheat and barley are the plants commonly encountered (Kirleis et al., 2012; Out, 2009).

Analysis of the relevant weed flora in the Rhine–Meuse delta showed that the weeds are indeed dominated by summer-annuals, suggesting spring-sowing. However, some winter-annuals are also present in the sites studied (Out, 2009, p. 428), and the hypothesis that the appearance of summer varieties of emmer wheat and barley made crop cultivation possible at least in that area remains open to debate.

2. Fields, short-lived or long-lived?

When crop growing was eventually adopted, the question is how these crops were produced. The population north of the loess belt obtained their plants from the LBK, or better, their successors, such as belonging to the Rössen, Bischheim and Michelsberg cultures (Out, 2009, p. 445). They must have seen their cultivation practices, but did they adopt these?

Scientists agree that LBK farmers cultivated their crops on small permanent fields, which some prefer to call gardens. The LBK did not apply slash-and-burn techniques (Bakels, 1978, p. 69; Bogaard, 2004). However, the first data collected for the main fully Neolithic culture in the north, the Funnel Beaker culture (TRB), did indeed point towards slash-and-burn cultivation. On the basis of Danish pollen diagrams, Iversen (1941) concluded that the fields of the TRB farmers were short-lived and connected with slash-and-burn. Experiments in Draved Skov, Denmark, confirmed this (Steensberg, 1979). For quite some time this view dominated many thoughts.

But were the fields everywhere so short-lived? Behre and Kučan (1986, p. 107) see in their pollen diagrams from the 'Siedlungskammer' (geographically limited habitation area) Flögeln, Germany, a direct parallel of the Iversen diagrams, but is this truly so? In the Danish diagrams mentioned before deciduous wood returns rather fast after the slash-and-burn impact, but this is not the case in the Flögeln diagrams. Open space seems more permanent and though this may be due to heavier grazing pressure of livestock than in Denmark and therefore not refer to actual fields, one could wonder whether the fields were indeed as short-lived as supposed to. The other end of the possibilities, i.e. permanent

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