# The early history of Cornflower (Centaurea cyanus L.) in the Netherlands

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# The early history of Cornflower (*Centaurea cyanus* L.) in the Netherlands

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ABSTRACT. Analysis of pollen and fruits show that the history of cornflower (*Centaurea cyanus* L.) in the Netherlands starts late. The first important finds date to the High Middle Ages. The origin of the plant as a weed in cereal fields is still unclear, but a start out of a refugium with Late Pleistocene/Early Holocene species is considered unlikely. The association of cornflower with rye is not as close as is often assumed, as rye gains importance earlier than cornflower.

KEYWORDS: *Centaurea cyanus*, cornflower, weed, rye, Middle Ages, archaeobotany

## INTRODUCTION

Up until ca 1950 Dutch cereal fields were very colourful thanks to their weed flora. White, blue, red, yellow, and pink enlivened the buff crops (Fig. 1). Farmers, however, were not happy to see this picture and modern methods enabled them to get rid of those unwanted plants. Nowadays cereal weeds can be observed only in special reserves.

**Fig. 1**. A colourful cereal field. Photo J. Goudzwaard

The composition of the weed flora varied with the kind of crop and with the characteristics of the local soil. The species are grouped together in phytosociological entities and the definition of the groups suggests that they existed as such since the beginning of agriculture. But archaeobotanists know that this is definitely not true. In the beginning only a few of the characteristic species were present, whilst others arrived in later millennia. Plants were added all the time, and some disappeared as well. For this contribution I have chosen to focus on the history of the cornflower (*Centaurea cyanus* L.). The plant is one of the diagnostic species of the phytosociological alliance Aperion spicaeventi (Tüxen in Oberdorfer 1949), which is an alliance within the class Stellarietea mediae (Tüxen, Lohmeyer et Preising in Tüxen 1950). The alliance was formerly known under the name of Secalinetalia Braun-Blanquet and can be found on neutral to acid sandy and loamy soils. The name Secalinetalia suggests that it is bound up with rye (*Secale*) fields, but cornflower thrives also in other types of cereal fields. The plant has beautiful blue flowers and I offer a bunch of these with pleasure to my valued colleague Krystyna Wasylikowa.

## EVIDENCE OF CORNFLOWER IN THE PAST

*Centaurea cyanus* can be detected by its pollen and its fruits. Both are fairly characteristic. Pollen is commonly preserved in waterlogged environments, although it can also be preserved in ancient soils (see below). The fruits are preserved either waterlogged, or carbonized, or mineralized. Cesspits reveal fragmented fruits, mostly in combination with cereal bran and other fragmented large-seeded weeds such as corncockle (*Agrostemma githago* L.) and black bindweed (*Fallopia convolvulus* (L.) Å Love). Figure 2 shows such an instance of fragmented cereal weeds found together in a 13$^{th}$ century cesspit excavated at Windesheim, the Netherlands. At the same time, the picture serves as an example of the different backgrounds of


**Fig. 2**. Fragments of cornflower (**a**), corncockle (**b**) and black bindweed (**c**) found in a cesspit. Photo Jan Pauptit

weeds. Black bindweed traces back its history in fields to the first farmers to be found in the Netherlands, i.e. the farmers of the Linearbandkeramik (Linear Pottery) culture, 5300 calBC (Bakels 2009) Corncockle arrived at the beginning of our era, with the Roman army of occupation (Bakels 2010). But in the cesspit they belong to the same set, i.e. weeds with seeds with sizes and weights almost equal to cereal grains and therefore difficult to discard. The seeds were obviously ground together with the grain to end up in a coarse flour.

## THE FINDS

### POLLEN

*Centaurea cyanus* pollen (Fig. 3) is occasionally found in Late Pleistocene and Early Holocene contexts (e.g.Willerding 1986). Presumably the herb was part of the steppe vegetations of those times. It disappears from the records during the Boreal, Atlantic and Subboreal periods except for three pollen grains found in a small peat-filled basin, now drained, in the southeasternmost part of the Netherlands. The cores Voerendaal 1 and 2 revealed single pollen dated to the Subboreal (Firbas zone VIII) at depths of respectively 55 cm and 50 cm below the actual surface. A third core, Cortenbach 2, brought a single grain at a depth of 87.5 cm below the surface, dated to the Atlantic – Firbas zone VII (Janssen 1960). Later investigations in the same basin did not reveal any *Centaurea cyanus* pollen (Bakels unpublished) and one may wonder whether the pollen found by Janssen should be considered as intrusion, but it may also be possible that it is not and that some cornflower plants survived in a kind of refugium. Leaving these finds aside, cornflower pollen reappears in the records during the Late Subatlantic.

As 'Late Subatlantic' is a rather coarse indication we need more precise dates. The best information is provided by pollen records from ancient fields and fortunately such fields exist. Arable soil gets its share of the regional, extralocal and local pollen rain just as any other surface. Normally such pollen vanishes after a certain number of years, but covered by sediment pollen is preserved. This is the case when fields are buried under wind-blown sand, or when they are covered by 'plaggen' manure.

Plaggen manure is obtained by cutting sods (plaggen in German) in the natural vegetation, spreading out those sods in the stable where they get drenched by urine and faeces, shoveling them out again, mixing them with household and other wastes, and carting them to the fields. As the sods contain much mineral matter which does not decay, the surface of the fields is raised every year, and although the arable is mixed by ploughing, a certain stratigraphy will build up, because the raising of the surface exceeds the ploughing depth. In such plaggen soils pollen are very well preserved (Groenman-van Waateringe 1988, Bakels 1988) and because of the stratigraphy pollen diagrams can be obtained from them.

Plaggen soils are very common in the southern, central and eastern parts of the Netherlands, in fact everywhere where the subsoil is sandy. Pollen diagrams show, as may be

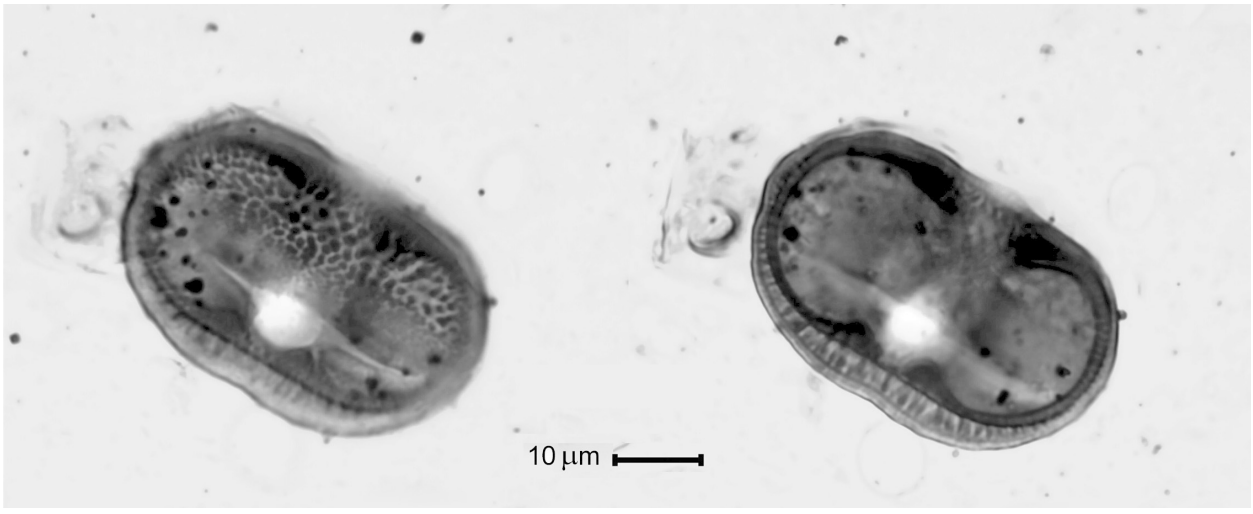


**Fig. 3**. Cornflower pollen found in a cesspit, same grain, different focus. Photo BIAXconsult

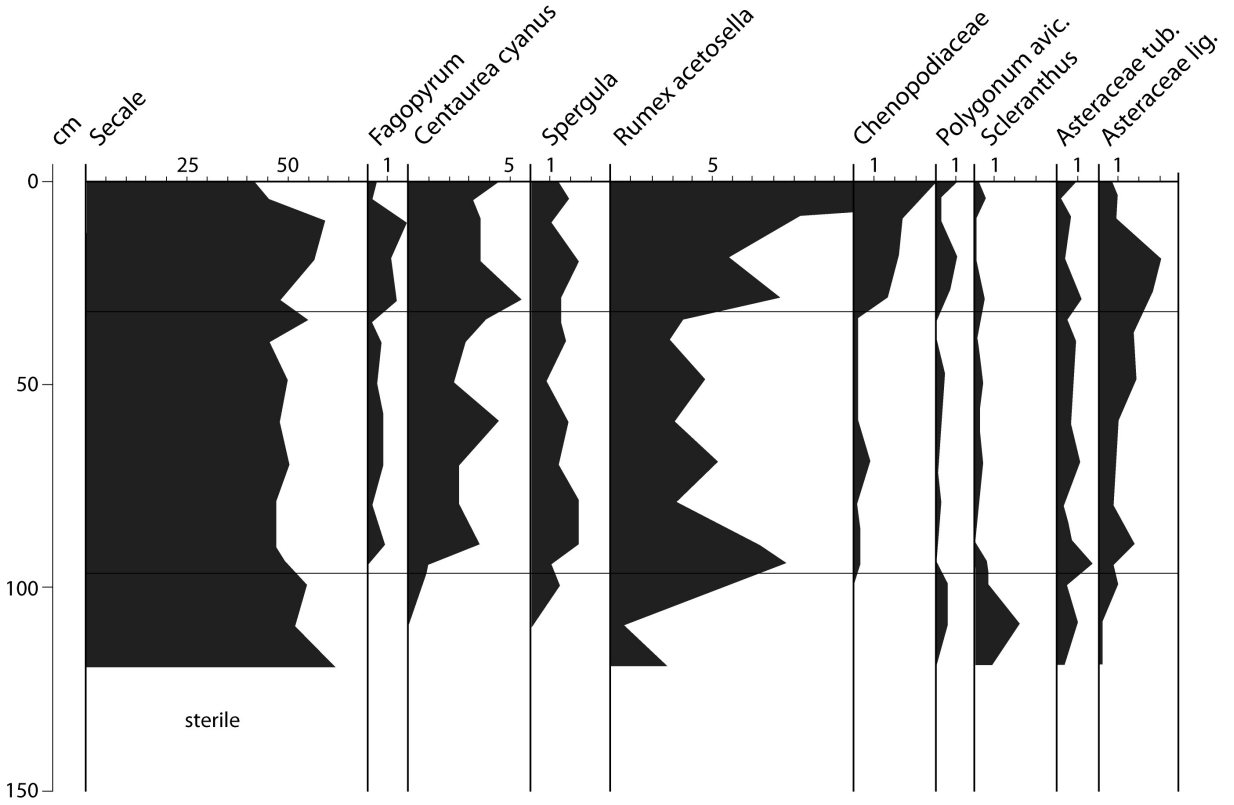


**Fig. 4**. Pollen diagram of the plaggen soil at Son en Breugel (Netherlands), selection of curves

expected, high percentages of crop plants and weeds, including *Centaurea cyanus* (Fig. 4). It is clearly shown that cornflower appears later in the records than weeds like Asteraceae, *Rumex acetosella*, and *Scleranthus*. It is known that the practice of plaggen manuring started rather late in the Middle Ages (Hiddink & Renes 2007, Spek 1992, van Mourik et al. 2011). The horizon with the start of the cornflower pollen curve depicted in Figure 4 was dated by the potsherds brought in as part of the household waste component of the manure and attributed to the 13$^{th}$ century (Bakels 1988). As cornflower pollen is absent from the earliest plaggen soil horizons, this would imply that the plant was a latecomer in our fields.

The observation that cornflower was absent in Early Medieval fields has been stressed earlier by Pals and van Geel (1976), who observed, for instance, that the Early Medieval, 8$^{th}$ to 10$^{th}$ century, arable soils of the central parts of the Netherlands, buried under wind-blown sand, are characterized by high pollen values for rye and other cereals, several kinds of weed including *Rumex acetosella*, Asteraceae, and *Scleranthus* to mention a few, but that *Centaurea cyanus* is conspicuously absent.

## FRUITS

Cornflower fruits (Fig. 5) do not appear in the records before the beginning of our era. The earliest find so far is a single carbonized fruit found at Brakel in the southern part of the Netherlands (Hänninen 2005), and is dated AD 100–200. There are three other single finds, two from Maastricht and one from Cuijk, which are dated before AD 450 and probably belong to the last phase of the Roman occupation. (Bakels & Dijkman 2000, Bakels 2007, van Haaster 2006). Both sites are also situated in the southern parts of the Netherlands. Six sites revealed fruits dated before AD 1100. These are Medemblik and Leeuwarden in the north of the Netherlands, Pesse in the east, Vlaardingen in the west, Kootwijk in the centre, and Swalmen in the south (Radar 2006). The 'richest' find comprises eight fruits.

All other finds of cornflower are of later date and many of those revealed quite a number of fruits. The conclusion must be that cornflower as a living plant was at least present as early as the Early Middle Ages. Regarding the four Roman period finds this is not so certain. Brakel, Maastricht and Cuijk are sites

bordering a large river, in the case of Brakel a southern branch of the river Rhine and in the case of Maastricht and Cuijk the river Meuse. Both rivers were important to the Roman army and knew a lot of traffic, including cargos of grain. All three sites are characterized by a significant number of Roman imports; moreover, Maastricht and Cuijk were important traffic junctions. The cornflower fruits may therefore not be of local origin.

Regarding the Early Medieval sites, it should be noted that Medemblik and Leeuwarden were also actively trading and may have imported their cornflower too. But sites like Pesse, Kootwijk, and Swalmen were truly rural sites and their cornflower must have been of local origin. Nevertheless, in the beginning cornflower will have been rare. In Kootwijk, for instance, only one fruit was found during the investigation of 200 samples, obtained from all kinds of features covering a period of some two centuries, whilst those samples revealed sufficiently important numbers of other weeds (Pals & van Geel 1976).

The conclusion must be that cornflower became an important weed not earlier than the High Middle Ages.

**Fig. 5**. Cornflower fruit retrieved from a late medieval site near Leiden (Netherlands). Actual length 3.9 mm. Photo Jan Pauptit

## DISCUSSION

As a cereal weed *Centaurea cyanus* is apparently a latecomer. But where did it come from? The question was already raised by Willerding (1986). He remarks that the cornflower of the Pleistocene and early Holocene steppes may well have been brought to extinction by the expansion of forests, but that stands may have persisted in refugia, on terrain where trees could not get a hold. Willerding (1986) mentions the coastal area of the Baltic Sea as a possibility. But Hübl et al. (1996) came to the conclusion that it is not at all clear and even not probable that the early cornflower pollen grains were released by the same species as was growing in the much later cereal fields. They think that the earlier pollen was released by *Centaurea depressa* Bieb., a species with pollen grains almost undistinguishable from those of *Centaurea cyanus*. According to them *Centaurea depressa* is, from an ecological point of view, better adapted to Pleistocene conditions in Europe than *Centaurea cyanus*. If they are right, cornflower cannot have crept into European cereal fields starting from a refugium.

An alternative is that the weed must have been spread together with a crop. But which crop? The natural habitat of the weed is situated in Turkey and south-eastern Europe (Hübl et al. 1996), and precisely from that direction the first crops arrived in Europe. But the first farmers did not bring cornflower along with their crops to Central and Western Europe. Could it be rye? Rye is a latecomer too, and is reported to have its origin in an aggregate of weedy ryes distributed over southwest Asia. Rye turns up in European sites from the first beginnings of agriculture, but always as a weed. The cereal as a crop in its own right appeared in Central and Western Europe just before or around the beginning of the Roman period (Behre 1992).

The weed cornflower is often associated with rye and in the Netherlands rye is certainly a latecomer. In the central and northern part of the Netherlands, that is north of the river Rhine, the cereal was grown from at least 100 calBC onwards. South of the Rhine rye came into fashion with the arrival of Roman troops of Germanic origin.

It is quite possible that the arrival of cornflower is indeed connected with rye. The plant may have travelled along with rye, belonging to

the same set of weeds, but rarer and therefore escaping detection in archaeobotanical records. Only after the rise of rye as true cereal, cornflower may have gained importance. Still, there is a considerable time lag between the rises of those two species. Early finds of rye concentrations fail to reveal cornflower for instance, in spite of the presence of various other weeds. This was so during the Pre-Roman Iron Age and remained so in Early Medieval finds as Pals and van Geel (1976) and van Zeist and Palfenier-Vegter (1979) already pointed out, and their statement still stands. Moreover pollen diagrams show that cornflower became a notable weed far later than the beginning of rye cultivation. If cornflower was present before the High Middle Ages, it was still rare. The same is true in adjacent Germany (e.g. Knörzer 2007).

Why did cornflower get the chance to become a troublesome weed, hated by farmers as it blunted their sickles? Several answers are possible. One is that the answer may be sought in a new source of cereals, as food, but at the same time used as sowing seed, imported from regions with much cornflower. During the Middle Ages there was a lively trade in cereals as staple food, especially along the coasts of the North Sea and the Baltic Sea. The Hanseatic league played a prominent role in this, operating between AD 1160 and AD 1650. Dutch towns were part of this alliance. Although the grain mostly went to towns, it is possible that the hinterland received its share of imported grain, and from there it is but a small step to use part of this grain also as sowing seed, especially if the grain is of high quality. It has been proven that Hanseatic trade provided countries like Finland and Norway with grain containing cornflower, grain which was originally grown in the Baltic region and Poland (Lempiänen 2007, Hjelle 2007).

An alternative explanation might be that the cultivation regime underwent a change. Behre (2008) is of the opinion that the first rye of northwestern Germany and the adjacent Netherlands was grown as a summer crop. As cornflower thrives mainly in winter crops this would explain its initial absence. But cornflower can also grow in summer crops and Pals and van Geel (1976) stress that the early Dutch rye finds do contain weeds typical of winter crops, though no cornflower. Thus, it may not be the change in sowing time. What did change was the crop diversity. On, especially, sandy soils the number of plant species grown fell off. Farmers relied more and more on the cultivation of only rye, even going so far as to alternate winter rye with summer rye, and almost nothing else (in German 'Ewiger Roggenbau'). But the most severe version of this kind of regime was not practised everywhere and then only from the 16$^{th}$ century onwards (Bieleman 1992). Nevertheless, as cornflower fruits lose their ability to germinate after 5–8 years they never become part of a seed bank in the soil. It is known that cornflower does not return readily to a field from where it has disappeared (Bakker & van den Berg 2000). Therefore it is quite possible that a continuous culture of cereals and only cereals did promote the success of cornflower as a weed.

## CONCLUSION

Cornflower is a latecomer in Dutch cereal fields. The plant is considered to have grown in the Netherlands from the Early Middle Ages onwards. In prehistoric fields cornflower is absent and its presence in the Roman period is open to doubt. But cereal fields full of the characteristic blue flowers were not to be seen before the High or even the Late Middle Ages. Where and how the plant became part of the weed flora of cereal crops is not yet clear. It is unlikely that the advance of cornflower will have to be traced back to refugia of late Pleistocene/Early Holocene vegetations. Somehow the weed has a link with rye, but the ins and outs of this link are far from clear. Trade may have played a role in its dispersal, but changes in crop cultivation may have been instrumental as well in promoting this blue jewel (or pest) in our fields.

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