

Lilium bulbiferum L. Subsp. *croceum* (Chaix) Arcang., The Orange Lily, a Special Plant of Lowland NW Europe

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ABSTRACT

The life history of the *Lilium bulbiferum* subsp. *croceum* has been described and analyzed since the orange lily was discovered around 1850 growing wild in rye fields in the northern part of the Netherlands and northwestern Germany. In this article the status of the orange lily has been discussed. The lily does not seem to be a garden escape as was thought in the 19th century, but should be treated as a native species. The orange lily belonged to the agricultural weed plant community, the *Sclerantho annui-Arnoseridetum*, of the so called “eternal” rye fields on the poor sandy soils in the old-morainic landscape. Due to changes in agricultural use both the orange lily and the other weeds became very rare. Recent research shows that the lily has mainly survived in gardens. In Govelin in Lower Saxony (Germany) the very last rich plant community of the *Sclerantho annui-Arnoseridetum* with thousands of *Lilium bulbiferum* subsp. *croceum* is still present. Because of its beauty the lily has and has had important cultural aspects. In flower symbolism, in medieval paintings and in 17th century Dutch and Flemish flower paintings it is an important symbol. For its orange colour several links to the Dutch royal family, the House of Oranje (= Orange) Nassau, were discovered.

Keywords: Roggelelie, Feuerlilie, *Sclerantho annui-Arnoseridetum typicum*, *Teesdalis-Arnoseridetum*, “eternal” rye cultivation, flower symbolism, Hortus Eystettensis, 17th century flower pieces, Govelin, Wendland

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INTRODUCTION

The current research started in the 1980's after the publication of the Atlas of the Dutch Flora (Hattink 1980). The atlas reported that that the orange lily had become extinct in the northern part of the Netherlands before 1950. The author knew that the orange lilies in the flower garden of his parents' farmhouse were dug from the fields at the back of the farm in 1952. Research showed that there were more flower gardens with orange lilies in the village of Gieten. An old farmer remembered that he had dug the orange lilies in his garden in 1964 from one of his fields. Much of the local knowledge of the retired farmers was new to the author. Doubt arose about the status of the orange lily. The orange lily had vanished from the fields. The results of the local research were published in the natural history magazine *Natura* (Bos 1986). The article was intended to be the

necrology of the extinct orange lily. Instead it became the beginning of detailed further research.

STATUS

The orange lily (*Lilium bulbiferum* subsp. *croceum*) is endemic in Europe with a main distribution in Central Europe, extending southwards to Spain, S. Italy and NW Yugoslavia (Matthews 1980). The distribution in the northern German and Dutch Plain was unknown to Matthews (personal comment). Matthews invited the author to publish the results of his investigations in northern Netherlands and northwestern Germany (Bos 1993). As a garden plant the orange lily has been cultivated in the Netherlands and several other countries for more than four centuries (Fuchs 1543; Dodoens 1554; Gerard 1597).

FIRST DISCOVERY

The first discovery of *Lilium bulbiferum* subsp. *croceum* growing in the wild in The Netherlands was near Zuidlaren in the northern province of Drenthe in 1853 "flowering in vast numbers between winter-rye, in parts so numerous that some parts of the fields turned orange-red" (Van Hall 1858). The lily was known to local farmers as a persistent, ineradicable weed. Even the grandparents of the farmers, when asked, remembered that the orange lily was already there when they were young. Around the same time the orange lily was discovered in several other places in the northern part of the Netherlands. During the same period the orange lily was also recorded in many places in northwestern Germany, mainly west of the river Elbe (Garve, personal comment).

GARDEN ESCAPE OR NATIVE PLANT?

From the beginning, the 19th century Dutch and German botanists found it hard to believe that such a beautiful lily, known to them as native in the Alps, was also a native in rye fields of the northwestern German and northern Dutch Plain. How could this plant species have such a disjunct native distribution? In the end they concluded that because it also grew in village gardens adjacent to these Dutch and German rye fields it must be a garden escape. It was assumed that bulbs and bulblets had become established on the manure heaps of the farmyards and from there had been carried to the fields. For more than a century editions of standard floras perpetuated the notion that this northern population could be dismissed as a garden escape (Buchena 1894; Heukels 1907).

DISTRIBUTION IN THE NORTHERN DUTCH AND GERMAN PLAIN

Nearly all known Dutch and German sites of *L. bulbiferum* subsp. *croceum* are situated in areas of base-poor, sandy and loamy boulder clay soils (Fig. 1A, 1B). These soils are associated with an old morainic landscape, a product of the ice sheets of the Saalian glaciation, 125,000-200,000 BP (Lopes 1985). In the 19th and previous centuries dating back until the early medieval period (Behre 1993) these soils were so poor through lack of nutrients, that sods, or turves, of heath land soil had to be mixed with sheep dung and spread over the fields to maintain sufficient fertility. Rye (*Secale cereale*), the least demanding of the cereal family, was by far the major crop and with such treatment the soils had the capacity to produce a rye crop year after year. Therefore these fields became known as the so-called "eternal" rye-fields (Fig. 2) (Behre 2008).

This field system had developed north of what was termed the loess line, and was especially characteristic of the old morainic landscape west of the river Elbe (Behre 2008). The North German heath lands share the same soils and plant-species mix as several Atlantic plants have their eastern distribution limit near the river Elbe (Graebner 1925). Both heath land and "eternal" rye fields belong to the sub-Atlantic climate on the northwest side of the European continent.

CHANGES IN AGRICULTURAL PRACTICE

In the 18th to the 19th century the heath lands degraded increasingly together with a diminishing quality of the sods. More heath lands were needed to maintain fertility. The recovery of the heath lands lasted longer and large sand flats started to develop. The whole agricultural system became exhausted beyond recovery and collapsed in the end. Many people had to emigrate. A sudden change in agricultural practice was caused by the use of artificial fertilizers which had been introduced by Justus von Liebig (1803-1873) around the middle of the 19th century. At the same time guano, bird dung from seabird colonies along the west

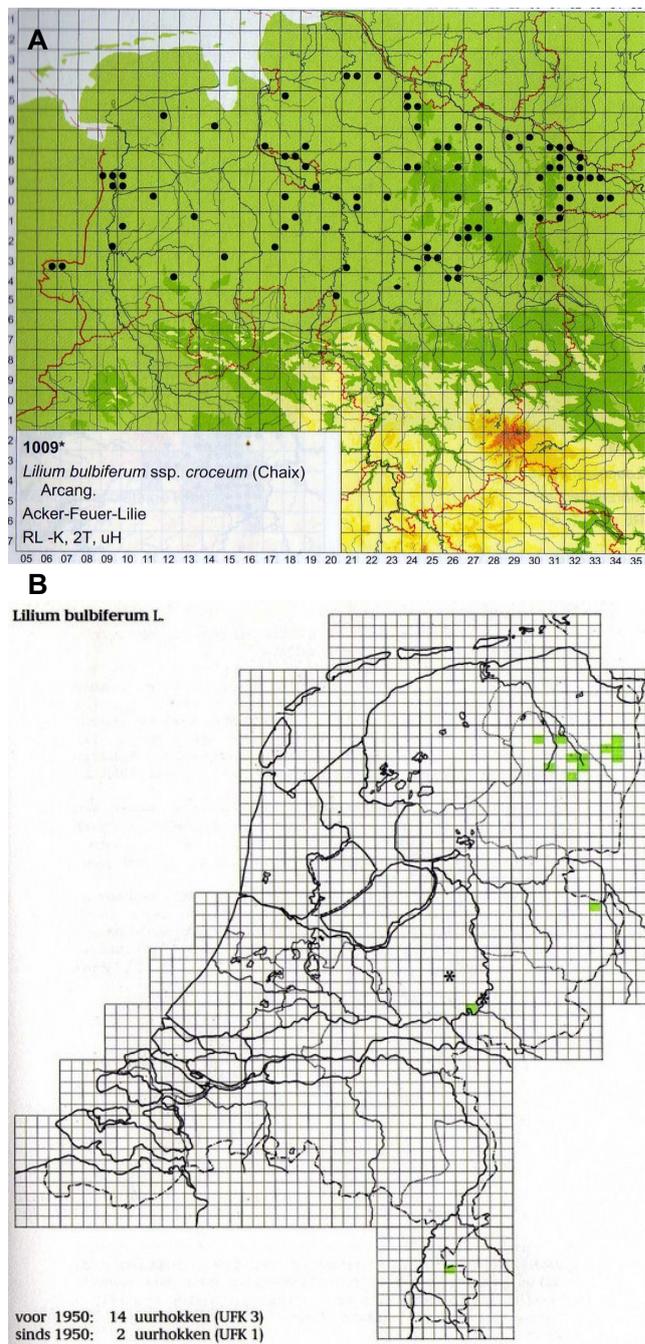


Fig. 1 (A) Distribution of *Lilium bulbiferum* subsp. *croceum* in Lower-Saxony (Garve 2007). (B) Distribution of *Lilium bulbiferum* subs. *croceum* in the Netherlands (Hattink 1980)

coast of South America became available (Behre 2008).

Sheep-rearing and too labor intensive sod cutting on the heath lands for manure became uneconomic (Spek 2004). This "agrarian revolution" together with improved means of transport of fertilizers, guano and produce/crops by rail and steamship greatly changed the way of farming. Farmers were exposed to the impact of global trade. Moreover imports of cheap foreign wool coincided with cheap cane-sugar imports. The cane-sugar replaced the more expensive heather-honey and both the numbers of bee colonies and the numbers of sheep rapidly declined. The demise of such traditional communal practices on the commons led to accelerated efforts to divide them between owners so that they could be converted into enclosed farmland (Demoed 1987). When sheep-grazing ceased on the remaining unenclosed heath lands they were colonized by natural *Betulo-Quercetum roboris* woodlands (Tüxen 1937).

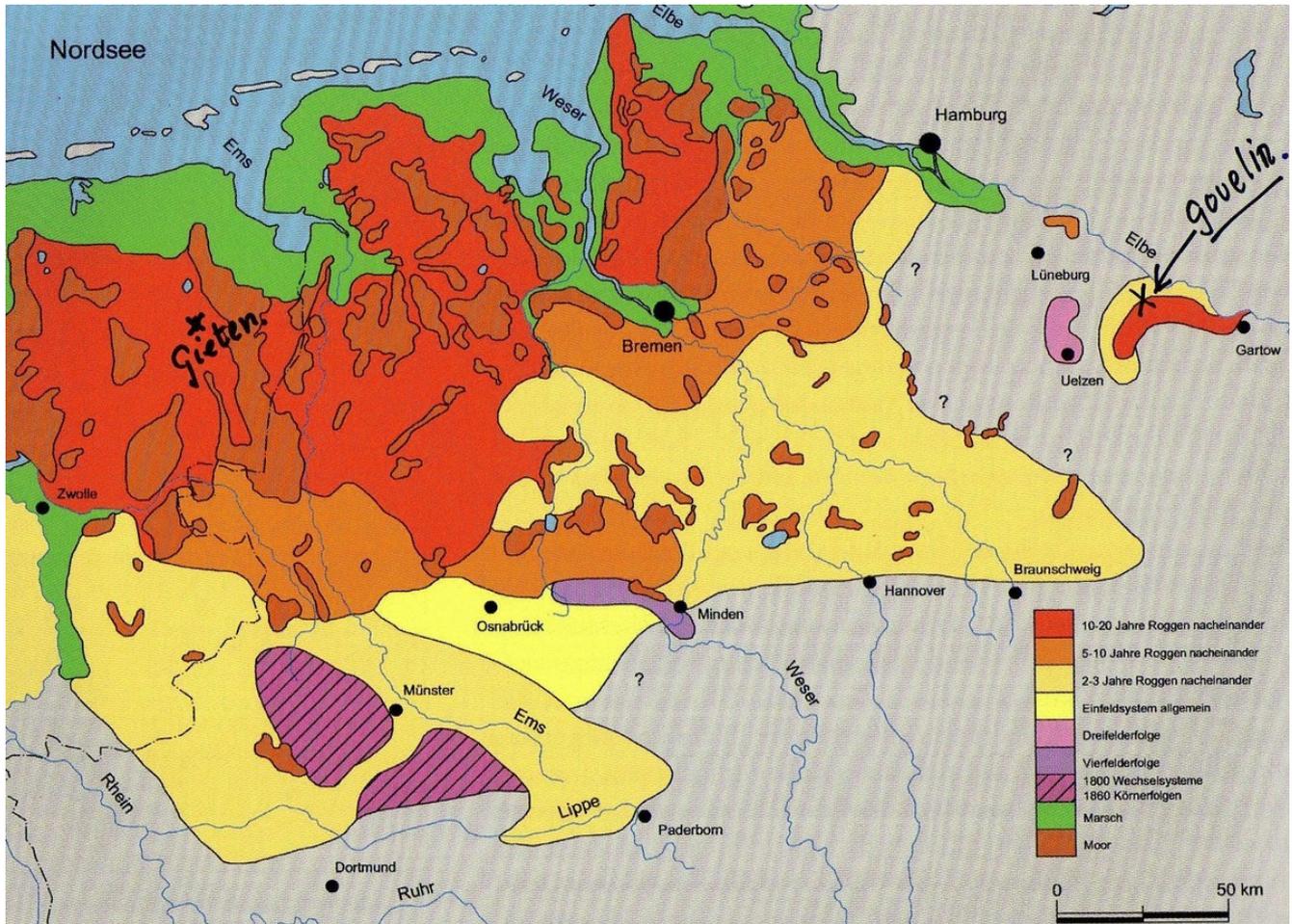


Fig. 2 Distribution of the eternal rye-fields in northwestern Germany and the northern Netherlands. (Behre 2008)

DECLINE IN OCCURENCE

Geophytes like the orange lily need a certain amount of disturbance to thrive. The lily was well established in the extensively farmed rye fields where the autumn ploughing regime was very shallow. The main bulbs remained undisturbed beneath the furrow. The subterranean bulblets along the stem were overthrown by the plough blade into the next furrow where they could take root. During the many years that this traditional treatment continued the plant managed to spread extensively over the fields. Subsequent changes in management had a profoundly negative effect on the lily.

Agricultural intensification, through manuring and crop rotation proved to be too much for the orange lily. Deeper ploughing and the growing of potatoes severely reduced the numbers of lilies. During the harvesting of potatoes many bulbs were also uprooted. The bulbs of the orange lily were valuable and were sold to bulb-growers as an additional source of income. New editions of Dutch and German floras (Heukels and Rotmahler several editions) recorded the decline of the orange lily. The last article to describe the decline of the lily in the Netherlands by Heimans presented a vivid description of its fate. An international botanical and geological excursion in 1911 to North Drenthe reported that the, by then, very rare orange lily was found in a rye field near Gieten, the home village of the present author (Fig. 3) (Lefebvre 1912; Heimans 1916). Heimans emphasized that the digging of bulbs for selling to bulb traders, was an important reason for its decline. Bulb growers/traders were usually well aware of the presence of lilies and other geophytes in the fields (Reid 1989) and apart from a single recent discovery in 1973 (Weeda 1973) there were no new post 1911 records. The "persistent and ineradicable" lily was thought to be extinct.



Fig. 3 *Lilium bulbiferum* subsp. *croceum* in Gieten in 1911. (Heimans 1916)

VEGETATION ECOLOGY

In the early decades of the 20th century vegetation ecology developed into an independent scientific discipline. After the publication of the pioneer work on vegetation ecology by Josias Braun-Blanquet (1884-1980), founder of the French-Swiss school of vegetation ecology, the description and classification of vegetation began in Central Europe (Braun-Blanquet 1928). The vegetation of NW Germany was described and classified by Reinhold Tüxen (1899-1980) (Tüxen 1937). By that time the orange lily had become so rare already, that the species was omitted from the description and classification of the winter-rye fields. The winter-rye weed community was described under the name *Scleranthus annuus* - *Arnoseris minima*-Ass. Tx 1937. Annual knawel (*Scleranthus annuus*), lamb's succory (*Arnoseris minima*), annual vernal-grass (*Anthoxanthum aristatum*) and downy hemp-nettle (*Galeopsis segetum*) are the characteristic species. Ecology and distribution of the winter-rye weed community: typical of the dry cereal fields in the area of the *Querceto-Betuletum typicum*, the oak-birch woodlands, on nutrient-poor quartz sand soils. Ecology and distribution of the *Querceto roboris-Betuletum typicum* Tx. 1930 are described in more detail: acidiphylous climax-community in the northwestern German Plain (old moraine) on dry, deep quartzitic sandy soil (paraclimax) with finely striated bands at 80-90 cm depth beginning in the B-horizon. The major part of the vegetation has always been very strongly influenced by man and was rare as mature woodland, being usually just low woodland, often degraded to scrub vegetation. It is still widely distributed. Since the Neolithic era it has been transformed, by grazing, fire, logging etc. into *Calluno-Genistetum typicum* heath lands. If left alone the heath land will revert to *Betula*-initial phase. Since the beginning of large scale forestry it has been replaced by an extensive mono-culture of *Pinus sylvestris* plantations. It is distributed on sandy soils in the northwestern European Plain. The expansion of intensive rye cultivation began in the Middle Ages. New finds from northwest Germany show that in this area rye has been cultivated as a main crop on poor soils since the Roman period (Behre 1992).

The first description and classification of the vegetation in the Netherlands was published five years after Tüxen under the name *Arnosereto-Scleranthetum* Tx. '37 (Westhoff 1942). Ecology and distribution in the Netherlands: a community from acid, poor sandy and loamy soils: pH 5.5 – 6.5. Optimally developed on old agricultural fields in the Saxon area: winter-rye fields on dry sandy soils.

DISTRIBUTION AFTER 1950

The *Atlas of the Dutch Flora* (1980) for extinct and very rare plants describes the orange lily in the English summary as follows: "*Lilium bulbiferum* was found in 14 5 × 5 km²-squares before 1950; since 1950 it has been recorded in 2 5x5km²-squares, from both of which it has now disappeared. The strong decline is generally caused by the introduction of crop rotation and digging-up the bulbs. The last locality (Weeda 1973) was exterminated by road-widening" (Hattink 1980).

The orange lily was thought to be extinct in the area of the former rye fields before 1950.

This statement is now known not to be true, because the lilies that grew in our flower garden in Gieten in the province of Drenthe were rescued by the author's father Albert Bos from the old rye fields on the "Zuides" at the back of our home in the winter of 1952 when the fields were transformed into sports grounds. The last time he spotted the orange lily in the fields around the village was in the summer of 1964.

A survey was carried out in the 1980's in and around Gieten and the adjacent hamlet of Bonnen and in some thirty private gardens the lily was still present.

Local oral history was invaluable during this survey.

The lily was known to elderly people under the local name roggelelie, rye-lily, referring to its favored arable niche. Some elderly garden owners even remembered where they had taken the bulbs from the fields. Exchange between garden owners had probably also occurred. Eight former rye fields could be traced where the orange lily was present in the past. To our surprise and delight one of these turned out to be the field where the lily was seen and described by botanists for the last time in 1911. The botanical and ecological description of these rye fields matches the description by Tüxen. Large-flowered hemp-nettle (*Galeopsis speciosa*) was a local character species of this weed community in this part of the Netherlands. Some people confirmed that the orange lilies were dug up during the winter at the beginning of the 20th century, because they could be sold for reasonable prices to bulb traders from the western part of the country. They were transported by train in jute bags. The results of these local studies were published 75 year after Heimans' visit to the village by the author (Bos 1986). This article was intended to be the concluding chapter, describing the final demise, of the roggelelie/orange lily. In 1986 the name roggelelie has become the official Dutch name (Van der Meyden 1986). Because there was a remote chance that it still survived elsewhere an appeal for information on any relict populations was incorporated into the 1986 article. This triggered such a response from so many different sources, that the study was expanded into a multi-disciplinary project. Because the orange lily had vanished from the fields the emphasis of this project had to be on old established flower gardens in the former areas from where the orange lily was known. It was found in several gardens along the Hondrug in Drenthe and in Westerwolde in eastern Groningen where a number of former rye fields could be located through oral history. Another source of information on the orange lilies arose from examining the history of the sale of cultivated lilies. According to flower bulb catalogues the orange lilies were on sale until 1950. After 1950 they were replaced by the cultivar *Lilium* "Orange Triumph" (Library of the KAVB in Hillegom). "Orange Triumph" has been found in one single garden.

The distribution of gardens which held the lily was surprising. There were several gardens in northern Groningen on the old dwelling-mounds. Equally unexpected was a concentration along the east side of the Veluwe, more than 25 km north of a known locality from the beginning of the 20th century where it was not found again. There was also a concentration along the Waal, the southernmost tributary of the Rhine and to a lesser extent along the Rhine itself. In all these gardens nothing was known about their origin. A plausible explanation for these clusters could be the traditional custom of exchanging beautiful garden plants. More explicable was the discovery of the orange lily in gardens along the river Overijsselse Vecht. At this site it probably originated from a population once known in a former rye field in the neighborhood. This new, but already extinct, locality had never been recorded before. Along the upstream German part of the river Vechte more gardens with orange lilies were discovered. Near Emlichheim one garden owner told us that his house had been built on a former rye field in which the lilies were growing. In this special case, at a new German station, the lilies had persisted at their original locality (Bos 1991).

Two more gardens with orange lily deserve a special mention. A gardener, of advanced years, was told in his youth by an old man that the lilies he cherished in his garden were taken by him from the famous garden belonging to the castle Groot Terhorne after the castle was demolished 111 years before (Mulder-Radetsky 1984; Bos 1989a). These are the only lilies so far with a proven cultivated garden origin. The other garden belongs to a Carmelite Convent. The Convent was built at the end of the 19th century on the fields close to the village of Zenderen in Twente and was surrounded by high walls from the beginning. With the consent of the abbess the walled garden was visited and the identification of the orange lily could be confirmed. Unfor-

tunately the origin of these Convent lilies was not known. Possibly they were present in the fields already, before the wall was built. It now seems likely that an earlier, but unconfirmed record from Twente was indeed correct (Bos 2008).

Quite spectacular was the discovery in 1986 of a new location for the orange lily in a former sand dune area on the bank of the ancient riverbed of the river Ems in the German Emsland just east of Westerwolde. Comparison with a French map from the first decade of the 19th century showed that this site on a former sand dune was not part of cultivated fields; instead it probably belonged to the dry grazing meadows, the so-called "Kuhweiden" along the river Ems (Bos 1989b; Pott 1991). The river would, almost certainly, have flowed freely in a meandering natural channel in the 19th century. Since then it has been canalized and as a result this locality is situated on the other side of the river Ems. Orange lilies can be found on either side of the river. Adjacent Westerwolde is/was also influenced by the river Ems system. The national border does not make any difference to the geology and the distribution of plants, but the farming practices and land use in modern times do make a difference. Detailed research by the author in the Emsland after the first discovery in 1986 in villages and adjacent fields on both sides of the river was very rewarding as agricultural pressure is less intensive in Germany than in the Netherlands and much more of the former landscape features remain. As a result there are more unimproved field corners. In many old Emsland village gardens on the ancient riverbanks of the river Ems orange lilies were still present. More local people than in the Netherlands remembered the lilies in the rye fields. After following directions from garden owners two localities with orange lilies were rediscovered in the fields. Altogether ten relict populations were found in the remnants of the old rye fields. They were mainly low in numbers in field corners, on roadsides and ditch slopes. Unfortunately many proved not to support viable populations. Twenty years later the author could only find two localities with one flowering plant each. The other eight localities had vanished. In 1988, like a bolt from the blue, came the discovery of four healthy, flowering orange lilies in the shade of a woodland margin close to an old rye field on the Hondsrug in Drenthe! In the adjacent village orange lilies were also present in several gardens. By growing in the wood margin they had escaped the intensive agricultural practices of the adjacent fields. Unfortunately this only locality has been vandalized. The bulbs of the flowering plants have been taken. There are only some small non flowering plants left.

NATIVE OR INTRODUCED?

Apart from the fact that the orange lilies grew in village gardens in the northern part of the Netherlands and Germany in the 19th century and shown a pronounced disjunct distribution, botanists had few other reasons to classify the lily as a garden escape. They had, little if any, knowledge of local traditions, gardening- and agricultural practices. In the past the typical small flower garden contained a limited number of strong and practical plants. A practical example of such plants was marigold (*Calendula officinalis*), growing along the walls of the houses, because it would ward off ants. On the farms there was no time for looking after tender or half-hardy plants. Drenthe did not have any wealthy gentry with extravagant gardens (De Vroome 1996). As there were no such things as today's garden centers beautiful plants were obtained by freely exchanging them with other garden enthusiasts. No money was spent on buying plants. The conditions were the same for kitchen and herb gardens. Each year fertile strong plants were selected for collecting seeds and other means of reproduction for the next season. In this way the plants became more adapted to the local circumstances and could develop into local varieties. Helping in the garden as a child meant being trained to prevent seed bearing plants from ending up in the manure

heap. These plants were usually thrown in the hen run. Chickweed! (*Stellaria media*) what's in a name? We consider it very unlikely that orange lilies would pass from the manure heap to the fields. When a farmer bought manure from someone else, he immediately recognized the unknown weeds, that he had to keep at bay together with the familiar ones (Tiesing 1921; Bos 1998a). Moreover garden books convinced lily growers to use only well-rotted manure, because lilies in general do not survive on fresh, "sharp" or strong manure (Chittenden 1951; Weathers 1901). This is an additional reason, why we consider it most unlikely that orange lilies would have been carried from the garden to the fields in the 19th century.

All interviewed garden owners who remembered the origin of their orange lilies told us that they had been taken from the fields, because they were beautiful and for free or that they received them from other garden owners. It is known that the same translocation from field to garden occurred with daffodils (*Narcissus pseudonarcissus*) in Drenthe (Beyerink, 1957). The distribution of the orange lily is disjunct and limited to and coinciding with the *Scleranthus annuus* - *Arnoseris minima*-Ass. Tx 1937. With all the new information it is argued that the species belongs to the indigenous flora of northwestern Europe. A reconstruction of the localities in the past makes it probable that *Lilium bulbiferum* subsp. *croceum* should be seen as a differential species of the *Sclerantho annui-Arnoseridetum typicum*, because the orange lily only thrives on well drained soils (Bos 1998b). When and how it arrived in northwest Germany and the northern Dutch Plain after the retreat of the glaciers is yet unsolved and needs further research.

LILIUM BULBIFERUM SUBSP. CROCEUM, AN ATTRACTIVE ORANGE PLANT OF GREAT CULTURAL SIGNIFICANCE

While studying the botany of the orange lily it became clear that it was not only a very attractive plant, but also a plant of great cultural significance. There were many unexpected cultural aspects arising from several very different disciplines. Other sources had to be consulted to complete the picture. To understand the full meaning of medieval manuscripts, statues and paintings it is essential to have knowledge of the great variety of symbols used. Illiterate people could "read" these codes and the symbols. Modern man has lost the major part of this knowledge. For this paper we must, of necessity, restrict the analysis of flower symbolism largely to the lilies. Lilies always stood for purity, virtue and faultlessness. This was especially true for *Lilium candidum*, the white or Madonna lily, probably because of its white colour. In medieval paintings the Annunciation of the impeccable Virgin Mary is announced to her by the angel Gabriel (St. Luke 1: 26-38). To emphasize her purity the angel is carrying the spotlessly white Madonna lilies or the lilies are already standing somewhere in a vase or growing in a stoneware urn (Brenninkmeijer-de Rooij 1996; Carr-Gomm 2001). Flower symbolism is not stable but underwent gradual change. Ironically the white, sweet scented *Lilium longiflorum* has become a modern symbol in gangster/mafia films. These sweet lilies cover the coffins of the bosses who did not die a natural death. The colour white stands for virginity, chastity and purity; orange/red stands for love and passion, but can also foreshadow future suffering (Koch 1964). To the author's knowledge the two oldest paintings, both triptychs, on which orange lilies are depicted, date from the 1470's and were both painted in Bruges and were commissioned by noble Italian clients. Hans Memling's (ca. 1430-1494) "Last Judgement" (1476-1471) is the most valuable work of art of the Muzeum Narodowe (National Museum) in Gdańsk in Poland. The triptych was captured during a hanseatic war, when it was on its way by ship to Italy (Milewska 1989). In the central part of the triptych archangel Michael is weighing the souls. Christ is watching from the rainbow above with a blood red



Fig. 4 *Lilium bulbiferum* subsp. *croceum*. (Bessler 1613) Courtesy of Teylers Museum Haarlem.

sword and a white lily on either side of his head. To the right naked people in dramatic postures are thrown into the flames of hell by devils. On the left panel a group of naked people waiting serenely for their turn to be welcomed by St. Peter who is standing low on the crystal staircase to heaven. Higher up the staircase angels are distributing fine clothes. At the foot of the staircase grows the orange lily, the last flower to be seen on Earth before setting foot on the staircase to heaven! The Portinari Triptych (1476-1478) by Hugo van der Goes (ca. 1440-1484) made its way to Italy and is exhibited in the Uffizi Gallery in Florence/Firenze in the most famous room together with the elaborate paintings by Sandro Botticelli (ca. 1445-1510). The central part depicts the Adoration of the shepherds. In the foreground there are two beautiful vases with different flowers, one of them with an orange lily. The lily foreshadows the future sufferings of Christ (Koch 1964). The author disagrees with Koch that the sheaf behind the vases consists of wheat; it should be a sheaf of rye.

Twice during our field work we heard, once in the Netherlands and once in Germany, that the orange lilies in the flower garden had been given as a marriage present to the bride by her parents in the first half of the 20th century. By chance we noticed that, in several graveyards in the Emsland, orange lilies stood in vases on graves. In the small villages it was not difficult to trace the gardens where these orange lilies came from. In eastern Poland the author found flowering orange lilies growing on graveyards and in flower gardens. The orange lilies in Icelandic gardens and on some graveyards were imported in the 1930's from Denmark, the Netherlands and the USA (Siggeirsson, personal comment). In 2010 the author saw orange lilies in gardens and in a church garden in Belarus. Herbals were among the earliest printed books in the (15-)16th century, often produced in the vernacular language and illustrated with woodcuts of varying quality. These woodcuts are part of the art of botanical illustration, but it is often difficult to recognize the species (Pavord 2005). The woodcut of the orange lily in Dodoens' Herbal is a reflected image of the woodcut in Fuchs' Herbal. Most of the herbal authors were apothecaries,

physicians and medical practitioners, rather than botanists. Several of these herbals have recently been reprinted, because they are the main sources of forgotten herbal knowledge. Many parts of lilies were once used for various medical purposes; a practice that has fortunately long ceased (Fuchs 1543; Dodoens 1554).

The first book devoted entirely to garden flowers is "*Hortus Eystettensis*". The book with superb copperplate engravings was commissioned by the flower loving Prince Bishop Johann Conrad von Gemmingen at Eichstätt and he had the flowers depicted growing in his splendid bishopric garden around the Willibaldsburg castle (Bessler 1613; Keunecke 1989). Several copies of the book were superbly painted with water colour in a studio (Fig. 4). Both castle and garden were demolished by Swedish troops in 1633 during the Thirty Years War. Nowadays the rebuilt Willibaldsburg is a geological museum. In 1998 the garden was recreated using the "*Hortus Eystettensis*" as a guide (Blass 2001). Apart from the garden the author has seen that orange lilies still grow in private gardens in Eichstätt.

THE 'IMPOSSIBLE' FLOWER PAINTINGS OF THE 17TH CENTURY

In the 16th century Antwerp in Flanders was a major center of world trade. In the 17th century Holland became one of the most prosperous regions of the world, with great commercial interests and colonies in Asia and America. In 1602 the Vereenigde Oostindische Compagnie (VOC), the very first multinational, was founded in Amsterdam, the unequaled center. This prosperity, first in Antwerp and later in Amsterdam was accompanied by a tremendous upsurge in patronage of arts. Several Dutch and Flemish artists rank among the world's best: Peter Paul Rubens (1577-1640), Rembrandt Harmenszoon van Rijn (1606-1669), Johannes Vermeer (1632-1675) and Jan Breughel the Elder (1568-1625). Following the Reformation the Church's role of patron of the arts declined (Segal 1990), and wealthy merchants took their place as patrons of the arts. One of the very important trades of the Netherlands was the flower bulb trade. Many new, unknown plants were collected from all over the known world. Most famous of all was the tulip in many varieties, introduced from the Ottoman Empire by the Leiden botanist Carolus Clusius (1526-1609). The trade and speculation with tulip bulbs led ultimately to one of the earliest known "asset bubbles"; the Tulipomania crisis of 1637 when many merchants went bankrupt (Dash 1999). The magnificent flower pieces of the Antwerp painter Jan Brueghel the Elder and his associates show the overwhelming interest in rare bulbs at that time (Fig. 5) (Winkelmann-Rhein 1968; Brenninkmeijer-de Rooij 1992; Taylor 1995; Anon. 2007).

Brueghel's surviving correspondence with his major patron cardinal Frederico Borromeo (1564-1631), archbishop of Milan is a very valuable source for the understanding of the flower pieces (Brenninkmeijer-de Rooij 1996).

The painted bouquets in the 17th century with many different common, rare and extremely expensive plants did not bloom simultaneously in real life and had to be fictitious. Brueghel made many trips to the secluded gardens on invitation of proud, wealthy garden owners to painstakingly portray the newly arrived plants on the spot, "fatta tutti del naturel" (drawn after nature). Bouquets were selected on demand by the patrons to make an aesthetic display so "that it will be a fine sight especially in winter". The more flowers in the painting, the higher the price. Brueghel wrote that he uses common flowers like lilies, roses, carnations and violets together with the rare ones and those that had never been pictured before. All the flowers were painted so realistically, that they can be identified accurately, but they seem always to have held in a vase too small to contain all the flowers.

In the spring of 1994 a series of four flower stamps was issued in the Netherlands, a red rose, a white daisy and a



Fig. 5 Jan Breughel de Oude Terracotta Vase, 1605 containing 58 plant species with 72 varieties, Private collection.

blue forget-me-not; the colours of the Dutch national flag and the orange lily for the orange royal pennant. The range was chosen from the very common daisy to the very rare orange lily. The responsible artist started the project in 1993 just after the flowering time of the lily. Jaap van Tuyl from Wageningen University and Research Center, who had received over the years several lily bulbs from the author for research, could help. In the 20th century, contrary to the 17th, it is possible to force lilies to flower in time for the picture on the stamp.

DUTCH ROYALTY

The founding father of the Dutch royal family is Willem I van Nassau (1533-1581). During his youth he inherited the principality of Orange in southern France. The French kings conquered the principality afterwards, but Willem was allowed to keep the title prince of Orange. Since then the royal family is called the House of Oranje-Nassau. The orange pennant to the national flag is only flown during royal festivities. Fans of national sports-teams are usually clothed in orange, matching the colour of the orange lily.

The first unexpected link between the royal family and the orange lily is a painting from 1660-61. The painting presents a wreath of flowers and fruits, painted by Jan Davidszoon de Heem (1606-1684), together with symbols of power like a lion and two eagles. In the center of the wreath is a portrait of the young prince Willem III (1650-1702), portrayed by Jan Vermeer van Utrecht (1630-1696). Between the portrait of the prince and the lion is a prominent picture of the orange lily together with the white lily. The lilies are almost certain a flattering reference to his righteousness and honesty (Taylor 1995; Anon. 2007). The expensive painting was offered to the prince by Vermeer and remained in the possession of the royal family until it was looted during the French occupation from 1795 until 1813. The painting was never returned and now it is exhibited in Palais des Beaux-Arts in Lyon in France. In 1688 Willem III, now William III, and his wife Mary Stuart cross

the North Sea to England during the "Glorious Revolution" to overthrow the reign of James II, Mary's father, because he had changed faith from protestant to catholic. Several protestant people who supported the take-over of power by William and Mary made a statement by planting orange lilies in their gardens. After the decisive Battle of the Boyne in Ireland on the 12th of July 1690 where William III defeated his catholic father-in-law, he became very popular with the northern Irish Protestants, the orange men. The orange lily gained popularity in Ulster protestant gardens (Woodcock 1936). The plants were usually flowering around the 12th of July and bunches of the orange flowers were taken along on the controversial commemorative march. The Catholics preferred the white Madonna lily in their gardens. Some time before the French Revolution there were skirmishes between the patriots and the supporters of prince Willem V, who ultimately fled to England in 1795. Where the patriots won, they tore up orange lilies and marigolds *Calendula* sp. from the gardens of the supporters of the prince. They prohibited the sale of the offending oranges, carrots and bulbs of the orange lilies in the markets (Gordon 1977).

GOVELIN, THE UNEXPECTED SURPRISE/ BOUNTY!

After the official presentation of the distribution atlas of the flora of Lower-Saxony (Garve 2007) in Hanover there was ample time left for the author to study in detail the distribution information of the "Ackerfeuerlilie" - German name of the orange lily - at the office. In Lower-Saxony the orange lily is found in more localities than in the Netherlands, but remains nevertheless an endangered species. When the staff-members were asked which of these localities was the most promising to visit, they were unanimous in their opinion that a visit to Govelin would be the most rewarding of all.

Since 2004 Govelin has an official government funded Lily path (<http://www.lilienpfad.de> in German). Govelin is a small, isolated hamlet, a former "Rundling", a special settlement type unique to the Wendland (Jürries 2004; Meibeyer 2005). An ideal "Rundling" has no through-road and is ending in a cul-de-sac. Govelin has four permanent residents and is situated on an old, undulating Saalian morainic ridge, nearly completely surrounded by the extensive hunting woodlands of the Göhrde in the Wendland. It is close to the river Elbe at the easternmost limit of the sub-atlantic "eternal" rye field system with the corresponding plant community *Arnosereeto-Scleranthetum* syn. *Teesdalia-Arnoseridetum minima* (Malc. 1929) Tx. 1937 (Preisling 1995, Hofmeister 2006). East of the river Elbe in Mecklenburg-Vorpommern the orange lily still grows in gardens, but has disappeared from the rye fields in the small, old morainic area close to the river (Fukarek and Henker 2006). In 1926 a fine painting "Dame in Lilien" has been produced by Hedwig Woermann in Ahrenshoop, an artists' colony along the Baltic coast of Mecklenburg (<http://www.kronbergermaler.de/news/fr060710.html> in German). Probably the orange lily was in 1926 present in a Mecklenburg garden near the coast.

In the Wendland we can find another unexpected connection with the Dutch royal family. Claus von Amsberg, the late husband of Queen Beatrix, was born in Hitzacker, a stone's throw away from Govelin. In feudal times a part of the fields belonged to the ancestors of Claus' mother. This link to Royalty was used to promote the orange lily during a lily-exhibition in 2008 in the Hitzacker museum. What is believed to be the most expensive hunting party ever held, took place in 1698 in the hunting palace of the Hanoverian kings in the nearby Göhrde hunting woodlands in honor of the English/Dutch king William III (Fig. 6). William and Mary were childless and they had to negotiate about the Hanoverian succession to the English throne. The Act of Settlement was signed in 1701. The Oranje-Nassau family tree in the Netherlands had more branches for succession in



Fig. 6 Willem III (1650-1702), prince of Oranje-Nassau. Since 1688, the king of England. The orange lily in this painting from 1662 is the oldest known link to Dutch Royalty.



Fig. 7 *Lilium bulbiferum* subsp. *croceum* along the access road to Govelin. Photo F. Bos.

the Netherlands.

In the early summer of 2007 the author, after following the advice given, saw the orange lilies for the first time in their last remaining natural habitat (Fig. 7). They were growing in the fields along the access road to Govelin, together with many of the other base poor sandy soil indicating species known from literature (Tüxen 1937). The weed plant community of *Sclerantho annui-Arnoseridetum* is the floristic part of the ecosystem of the poor sandy soils. From the faunistic part of the ecosystem ortolan bunting (*Emberiza hortulana*), the yellowhammer (*Emberiza citrinella*), the sky lark (*Alauda arvensis*), the wood lark (*Lullula arborea*), the golden oriole (*Oriolus oriolus*), the red-backed shrike (*Lanius collurio*) should be mentioned; in this place far away from noise of traffic. Red kites (*Milvus*



Fig. 8 Field with *Lilium bulbiferum* subsp. *croceum* near Govelin. Photo F. Bos



Triticum autem congregat in horreum meum

Fig. 9 Medieval harvester Der Schnittler, fragment of Hortus Delicarium. Herrade de Hohenbourg: Hortus Delicarium; Le jardin des Délices. (between 1160 and 1195). JC Wey (2004, 2009) Hortus Delicarium; Le jardin des Délices. La Broque 2nd Ed.

milvus) often fly overhead. After getting acquainted with the farmer Harry Bergmann and his wife Christel, who own the fields, the author was shown the richest fields with hundreds of flowering orange lilies (Fig. 8). Together with the non-flowering specimens they reach the thousands. It was like entering through the looking glass into Van Hall's description of the 19th century rye fields. It is unbelievable that such a mature ecosystem still exists. These fields have escaped agricultural intensification and are unique as they are the very last examples of their kind, developed over a thousand years (Fig. 9) (Behre 1993). Nothing is known so far about how and when the orange lily turned up in the weed vegetation.

These fields are a fantastic piece of agricultural history complete with an exceptionally high biodiversity. Unfortunately for the farmer the yields are too low to make a decent living.

Due to the undulating nature of the morainic ridge the complete gradient from dry on the top to moist at the bottom can be studied; both the dry and the moist sub-community can be clearly distinguished. On one of the lowest places where temporary floodings occur after heavy rainfall, a unique assemblage of plants has been discovered in 2007.

Dwarf Rush (*Juncus capitatus*), Chaffweed (*Anagallis minima*), Mousetail (*Myosurus minimus*), Blinks (*Montia fontana* subsp. *chondrosperma*) and Bristle Club-rush (*Isolepis setacea*) are rare to very rare representatives of the rich ephemeral vegetation types with dwarf rushes and diminutive herbs of the very rare and endangered alliance *Nanocyperion*. More study of the fields including research into insect populations is a high priority. The wart-biter (*Decticus verrucivorus*), a very rare grasshopper from extensive farm- and heath lands was heard and seen in the fields by entomologists. Both slowworms (*Anguis fragilis*) and sand lizards (*Lacerte agilis*) have been observed. To maintain this very rich biological wealth of the farm the family Bergmann participates in two government environmental schemes: 25 ha are set aside for the protection of the rare ortolan bunting and 52 ha for the protection of agricultural weeds. At least 15 Red Data Book plant species in Lower-Saxony are found on the farm (Garve 2007).

It is essential that the Government of Lower Saxony recognizes that these large fields are irreplaceable and that sufficient long term financial support is needed for their survival. Once gone they can never be recreated. In the Netherlands only fragments of the *Sclerantho annui-Arnoseridetum* remain. Everybody is invited to enjoy the beauty of the flowering orange lilies in early summer and to come and support the Bergmann family. The lily festivities are held each year at the end of June. For further details see the website: www.lilienpfad.de in German.

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REFERENCES

* in Dutch

** in German

- Anonymous** (2007) *Bloemen in het Mauritshuis*, Waanders Uitgevers, Zwolle, 72 pp*
- Behre KE** (1992) The history of rye cultivation in Europe. *Vegetation History and Archeobotany* **1**, 141-156
- Behre KE** (1993) Die tausendjährige Geschichte des *Teesdalis-Arnoseridetums*. *Phytocoenologia* **23**, 449-456 (in German with English summary)
- Behre KE** (2008) *Landschaftsgeschichte Norddeutschlands, Umwelt und Siedlung von der Steinzeit bis zur Gegenwart*, Wachholtz, Neumünster, 308 pp**
- Bessler B** (1613) *Hortus Eystettensis*, Nürnberg (in Latin)
- Beyerink W** (1957) De vroegbloeiende tijlozen (*Narcissus pseudonarcissus* L.) in ZW-Drenthe en ZO-Friesland. *De Levende Natuur* **60**, 283-288*
- Blass C Eds** (2001) *The garden at Eichstätt*, Taschen, Köln, 191 pp
- Bos F** (1986) De roggelelie (= oranjelelie, *Lilium bulbiferum croceum*) op de essen van Gieten en Bonnen. *Natura* **83**, 60-65*
- Bos F** (1989a) De Roggelelie nog steeds wild in Drenthe en in Noord-Duitsland. *Natura* **86**, 79-83*
- Bos F** (1989b) De Roggelelie (*Lilium bulbiferum* L. subsp. *croceum* (Chaix) Baker) nog steeds in Drenthe en in Noordwest-Duitsland. *Gorteria* **15**, 59-61*
- Bos F** (1991) Die Acker-Feuerlilie (*Lilium bulbiferum* subsp. *croceum*), eine übersehene Art im westlichen Niedersachsen. *Floristische Rundbriefe* **25**, 107-108**
- Bos F** (1993) *Lilium bulbiferum* subsp. *croceum* in the Netherlands and Northern Germany. *The Kew Magazine* Vol. **10** Part **4**, 190-197
- Bos F** (1998a) Rogge-roet: Bestrijding en verspreiding. *Natura* **95**, 99-102*
- Bos F** (1998b) De plantensociologische positie van *Lilium bulbiferum* subsp. *croceum* in Noordwest-Europa uitgespit. *Stratiotes* **16**, 3-11 (in Dutch with English summary)
- Bos F** (2008) Nieuws over de Roggelelie, deel 8. *Natura* **105**, 44-47*
- Braun-Blanquet J** (1928) *Pflanzensoziologie*, Verlag von Julius Springer, Berlin, 330 pp**
- Brenninkmeijer-de Rooij B, Broos B, Meijer FG, Van der Ploeg P** (1992) *Mauritshuis in Bloei: Boeketten uit de Gouden eeuw/The Mauritshuis in Bloom: Bouquets from the Golden Age*, Waanders Uitgevers, Zwolle, 112 pp
- Brenninkmeijer-de Rooij B** (1996) *Roots of 17th-century Flower Painting, Miniatures Plant Books Paintings, Primavera* Pers, Leiden, 96 pp
- Buchenau F** (1894) *Flora der nordwestdeutschen Tiefebene*, Leipzig, 550 pp
- Carr-Gomm S** (2001) *The Secret Language of Art*, Duncan Baird Publishers Ltd., London, 256 pp
- Chittenden FJ** (1951) *Dictionary of Gardening* (Vol 3), Clarendon Press, Oxford, pp 1166-1167
- Dash M** (1999) *Tulipomania. The Story of the World's Most Coveted Flower and the Extraordinary Passions It Aroused*, Victor Gollancz, London, 288 pp
- Demod HB** (1987) *Mandegoed Schandegoed, de Markeverdelingen in Oost-Nederland in de 19de Eeuw*, De Walburg Pers, Zutphen, 176 pp (summaries in English and German)
- De Vroome H** (1996) *Drentse Boerenerven en Tuinen*, Van Gorcum en Comp. b.v., Assen, 166 pp*
- Dodoens R** (1554) *Crujdeboek*, Antwerpen*
- Drysdale Woodstock H, Coutts J** (1936) *Lilies, their Culture and Management*, Country Life Limited, London, 242 pp
- Fuchs L** (1543) *New Kreüterbuch*, Basel**
- Fukarek F, Henker H** (2006) *Flora von Mecklenburg-Vorpommern, Farn- und Blütenpflanzen*, Weissdorn-Verlag, Jena, 428 pp**
- Garve E** (2007) *Verbreitungsatlas der Farn- und Blütenpflanzen in Niedersachsen und Bremen*, NLWKN, Hannover, 507 pp**
- Gerard J** (1597) *The Herball*, London
- Gordon L** (1977) *Green Magic, Flowers, Plants and Herbs in Lore & Legend*, The Viking Press, New York 200 pp
- Graebner P** (1925) *Die Heiden Norddeutschlands und die sich anschließenden Formationen in Biologischer Betrachtung*, Verlag von W. Engelmann, Leipzig, 272 pp**
- Hattink ThA** (1980) *Lilium bulbiferum*, Oranjelelie. In Mennema, J. *Atlas van de Nederlandse Flora* **1**, 143 *Uitgestorven en zeer zeldzame planten*. Uitgeverij Kosmos, Amsterdam, 226 pp (in Dutch with English summaries)
- Heimans E** (1916) Noord-Drente. *Uit de natuur* 111-117 Uitgegeven door De Maatschappij voor goede en goedkoopere lectuur, Amsterdam, 327 pp*
- Heukels H** (1911) *De Flora van Nederland Deel I*, Leiden/Groningen p 260/261*
- Hofmeister H, Garve E** (2006) *Lebensraum Acker*, Verlag Kessel, Remagen, 327 pp**
- Jürries W** (2004) *Rundlinge und Slawen, Beiträge zur Rundlingforschung*, Köhring, Lüchow, 144 pp**
- Keunecke HO** (1989) *Hortus Eystettensis, Zur Geschichte eines Gartens und eines Buches*, Schirmer-Mosel, München, 175 pp**
- Koch RA** (1964) Flower symbolism in the Portinari Altar. *The Art Bulletin* **46**, 70-77
- Lefebvre Mme** (1912) En Hollande. La lande et les dolmens. *Excursions scientifiques*. H. Lamertin, Bruxelles, 132 pp (in French)
- Lopes de Leão Laguna** (1985) Geologische tijdschalen. Utrecht/Antwerpen
- Matthews VA** (1980) *Lilium*. In: Tutin TG, Heywood VH, Burges NA, Moore DM, Valentine DH, Walters SM, Webb DA (Eds) *Flora Europaea* **5**, 34-35 Cambridge University Press, Cambridge, 452 pp
- Meibeyer W** (2005) *Rundlinge und andere Dörfer im Wendland*, Verlag und Offsetdruckerei Hartmut Geller, Weddel, 140 pp**
- Meyden R v.d. Vanhecke L** (1986) *Naamlijst van de flora van Nederland en België*. *Gorteria* **13**, 87-170
- Milewska D** (1989) Hans Memling, The last judgement. *National Museum in Gdańsk*. Gdańsk
- Mulder-Radetsky RLP, De Vries BH** (1984) "Groot Terhorne" te Beetgum. "Een der schoonste buitengoederen van dit gewest". Canaletto, Alphen aan den Rijn, 116 pp*
- Pavord A** (2005) *The Naming of Plants. The Search for Order in the World of Plants*, Bloomsbury, New York, 472 pp
- Pott R, Hüppe J** (1991) *Die HudeLandschaften Nordwestdeutschlands*, Westfälisches Museum für Naturkunde, Münster, 313 pp**
- Preising E, Vahle HC, Brandes D, Hofmeister H, Tüxen J, Weber HE** (1995) *Die Pflanzengesellschaften Niedersachsens, Einjährige ruderaler Pionier-, Tritt- und Ackerwildkraut-Gesellschaften*, NLWKN, Hannover, 94

pp**

Reid M (1989) Over exploitation of wild bulbs by the horticultural trade. *Herbertia* **45**, 6-12

Rotmahler W (2005) *Exkursionsflora von Deutschland Band 4 Gefäßpflanzen: Kritischer Band* (10th revised Edn), München 2005

Segal S (1990) *Flowers and Nature, Netherlandish Flower Painting of Four Centuries*, Hijnk International b.v., Amstelveen, 302 pp

Spek T (2004) *Het Drentse Esdorpenlandschap, Een Historisch-geografische Studie*, Uitgeverij Matrijs, Utrecht, 1100 pp (in Dutch with English summary)

Stace C (2010) *New Flora of the British Isles* (3rd Edn), Cambridge 1130 pp

Taylor P (1995) *Dutch Flower Painting 1600-1720*, Yale University Press, London, 223 pp

Tiesing H (1921) De Drentsche Korenessen. *Cultura* **33**, 128-143*

Tüxen R (1937) *Die Pflanzengesellschaften Nordwestdeutschlands*, Reprint 1970 Verlag von J Cramer, Lehre, 170 pp**

Van Hall HC (1858) Aanteekeningen omtrent eenige Nederlandsche planten. *Verlagen en Mededeelingen van de Afdeeling Natuurkunde. Koninklijke Akademie van Wetenschappen* **8**, 18*

Weathers J (1901) *A Practical Guide to Garden Plants*, Longmans, Green, and Co. London, pp 842-843

Weeda EJ (1973) Een recente vondst van *Lilium bulbiferum* L. subsp. *croceum* (Chaix) Arcang. *Gorteria* **98**, 89 Leiden*

Westhoff V, Dijk JW, Passchier H (1942) *Overzicht der plantengemeenschappen in Nederland*, GW Breughel Uitgever, 's-Graveland, 79 pp*

Winkelmann-Rhein G (1968) *Blumen-Brueghel*, Verlag Du Mont, Köln, 88 pp**