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# How the wild tulip (*Tulipa sylvestris* L.) found its way in Northern Europe in the 17th to 19th century: a search through historical gardens and archives

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**ABSTRACT**

*Tulipa sylvestris* is a tulip species with yellow fragrant flowers that was introduced to Northern Europe from the Mediterranean region in the 16th century. Two and a half centuries later, the plant was described as naturalized and had found its place in and outside many gardens of Europe. Today, it is the only tulip species that grows wild in Northern Europe. Two main routes have been described for the16th-century introduction: one from Italy, around Bologna, and one from France, around Montpellier. We explore the further introduction and naturalization history of *T. sylvestris* in the Netherlands and Northern Europe in the 17th to the 19th century, providing an overview of mentions in herbaria, florilegia, catalogues, seed lists of botanic gardens, and garden magazines published in this period. We show that both the Italian and the French tulip remained in cultivation in Northern Europe, but also that most sources mention the Italian origin. The French tulip, linked to the subspecies *T. sylvestris* subsp. *australis*, is prominent in Scandinavian sources and occasionally appears in sources from the Netherlands, England and the German-speaking area. Furthermore, *T. sylvestris* was apparently exchanged on a regular basis between botanic gardens in Northern Europe around the second half of the 19th century. Finally, we demonstrate that in Friesland, a province in the north of the Netherlands where *T. sylvestris* still grows abundantly in historical gardens, many of the current locations coincide with historical and cultural sites, and the design of parks in landscape style in the 18th and 19th century.

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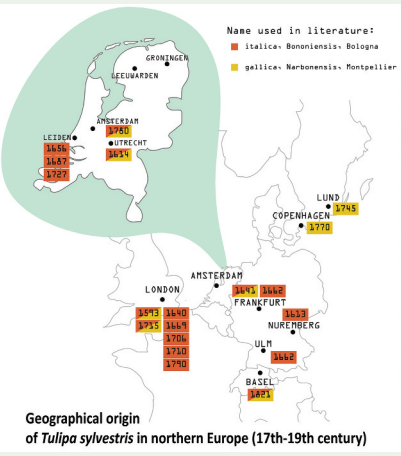


Geographical origin of *Tulipa sylvestris* in northern Europe (17th-19th century)

*Tulipa sylvestris* L.
Sloane herbarium
1660-1706

## Introduction

During the Middle Ages, gardens were mostly connected to an abbey, focusing on the study of medicinal plants. Gardens were often square or rectangular, divided into clear sections and sparsely planted, to allow close study of plants, which were organized mostly according to their properties (Leslie 2015). During the 16th century, the first botanic gardens were established, first in Italy (Pisa in 1543, Padova and Florence in 1545 and Bologna in 1568), and soon also in the Netherlands, first in Leiden (1587), later in Amsterdam (1638) and Utrecht (1639), followed thereafter by others (Cremers 1973; Rakow and Lee 2015). This development coincided with the Dutch Golden Age (approx. 1580–1670) which saw the establishment of the Dutch East India Company and the rise of wealthy Dutch families. The building of many estates was commissioned around this time, often with an adjacent garden, and so cultivated plants became more sought after and, therefore, more available. The

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way that gardens were perceived changed, and so did their function and layout: gardens were now a place meant to display the opulence of a family and were therefore enriched by colorful, fragrant plants, fountains, and small building structures (Rakow and Lee 2015). The French classical style was introduced in the Netherlands around 1670 (Hopper 1990), and plants started to be valued primarily for their appearance, smell, colors, and aesthetic value. The possession of exotic and rare plants was a sign of higher social and economic status.

The same changes were reflected in the botanic publications of the time. Medieval herbals focused on describing the individual plant species, their habit and habitat, and especially their medicinal properties and how to process them for application (Arsdall 2012). The scientific interest in plants expanded enormously during the Renaissance, and so did techniques such as wood print making. Beautifully illustrated botanical encyclopedias started to appear in both academic and wealthy circles (Dodoens 1568; Clusius 1601; Besler 1613). Florilegia (from "florilegium", literally meaning a collection of flowers) were highly illustrated books that show aesthetic appreciation of plants (Chen 2023). The term was first used in the *Florilegium Novum* by the engraver Adrian Collaert published in 1593 (Collaert 1593), which saw also a second edition 19 years later by Theodor de Bry (de Bry 1612). This coincides with the rise of European empires establishing global trading routes around the world, along which showy tropical plants were imported. Gardens gave enjoyment to the elite and showed their status, and this is reflected in contemporary *Florilegia* (Chen 2023).

Around 1750, the English gardens were changing from the baroque to a landscape style. The growing preference for natural elements had a wider impact, from philosophy to art, and from literature to landscaping (Bassin 1979). Moving towards the "picturesque" garden, important elements that were incorporated in the garden design were based on a view of the surrounding nature. They included a "natural" water element such as a brook or a pond, the creation of small hills, small swinging paths, trees planted in groups, in a more forest-style fashion, which allowed wandering through a semi-natural landscape. The garden was now a place to rest and retreat from the chaos of the city (Hunt and Willis 1988). A growing amount of plants from other parts of the world entered Dutch gardens, orangeries, and greenhouses, which were often heated to allow cultivation of tropical plants (Hind et al. 1988; Johnson 2019).

This period also coincided with the Enlightenment, the time of reason, order, the Scientific Revolution. More scientific work was produced about plants, such as that of Herman Boerhaave (1668–1738) who became head of medicine and botany at the University of Leiden (Offerhaus et al. 2023). Via Boerhaave, Carolus Linnaeus met George Clifford and became superintendent of the gardens at Clifford's manor "De Hartekamp" in Heemstede. During his stay there, Linnaeus published a systematic description of the collection, the *Hortus Cliffortianus* (Linnaeus 1737; Blunt 2001). This was a stepping stone to his *Species Plantarum*, where he brought together all plant species in one scientific system (Linnaeus 1753), which profoundly influenced the arrangement of botanic gardens.

The landscape style was still popular in the 19th and the beginning of the 20th century but gradually changed into a "gardenesque" one. For this style to be recognized as art, the layout was changed to a more geometrical one, to avoid any similarity with nature, and plants in these gardens were often cultivated hybrids or tropical ones. This style was mainly used in the direct surroundings of the house, while the rest of the park or venue was still planted in landscape style (Thacker 1985). Many landscape architects of the time also cultivated their own plants to use in parks and gardens, and plant catalogues were supplemented with new species and hybrids (see Oldenburger 2010; Haverman et al. 2016). For instance, Hendrik van Lunteren (1780–1848), a known garden architect from Utrecht, had his studio and nursery at the Flora Hof, where he maintained a collection of trees, and other perennial and annual plants (Waanders 2000). Other examples of families of landscape designers and plant growers were the Zocher family in Haarlem, Copijn in Groenekan and Vroom in Eelde. They designed gardens and provided plants for many of the Dutch historical castles and estates in that period and many of their catalogues are still preserved (Kuijlen et al. 1991; Waanders 2000). Famous in Friesland was Lucas Pieters Roodbaard (1782–1851), who got commissions for many Frisian estates in a period of urban transformation in the area (Radetzky 2021).

The urban transformation in Friesland in the 18th and 19th century saw, among others, the breakdown of "stinzen" (small, reinforced houses that could give shelter to people in times of danger during the Middle Ages) due to the high maintenance costs of these buildings. The remains were used to create hills in naturally landscaped gardens and were richly planted with bulbs and other plants to create a natural look, and these flowered in late winter or early spring, before the trees had set leaves. Known as stinzen plants (*stinzenplanten* in Dutch), these plants were brought mostly from southern Europe, had often showy flowers and they (Baas 1998). Although not native to the Netherlands, they thrived in the calcium-rich environment created by the debris. This kind of environment, called stinzen environment (*stinzenmilieu*), is not very common in the Netherlands and was created by human interaction

throughout history. Man-made mounds (terpen), built to make peatlands habitable, Roman levees, and line forts, the extraction and drying up of peat: it all brought about the creation of a calcium layer on top of the existing soil, which is ideal for stinzen plants (Bakker and Boeve 1985; Baas 2004). Even though the Frisian term "stins" is typical for those buildings in Friesland, stinzen plants are also present in Groningen, around many country estates in Utrecht, and in Zeeland (Bakker and Boeve 1985). The same phenomenon is also known in other Northern European countries, for example, Germany, where stinzen plants are known as indicators of former horticulture (Kowarik and Wohlgemuth 2006). Today, stinzen plants announce the arrival of spring in quite a vast area of the Netherlands, starting from the early *Galanthus nivalis, Crocus vernus, Eranthis hyemalis*, through various species of *Narcissus*, *Anemone, Hyacinthus* and *Scilla*, and among those, the only wild (naturalized) tulip of the Netherlands, also known as the queen of the stinzen-plants, *Tulipa sylvestris* L. (Tonckens et al. 2020). *T. sylvestris*, commonly called the wild tulip, or "bostulp" in Dutch, is a slender tulip with fragrant yellow flowers. It is less showy than the commercial ornamental tulips, which originate from the complex garden hybrid *T. gesneriana* (Christenhusz et al. 2013).

*Tulipa sylvestris* L. was introduced in the Netherlands and Northern Europe in the 16th century, around the same time that ornamental tulips came to Europe (Stefanaki et al. 2022). Ornamental tulips reached the Ottoman empire from Central Asia, where they soon became a symbol in arts and religion (Roding and Theunissen 1993; Pavord 2019). They also attracted the attention in Western Europe between the 16th and 17th centuries. Early travelers who brought tulips to Europe were the French botanist and diplomat Pierre Belon (1517–1564) (Belon 1553), and the ambassador of the Habsburg emperor in Istanbul, Ogier Ghiselin de Busbecq (1522–1592) (de Busbecq 1595). The tulip mania, a period in which tulip bulbs were sold in absurd high prices, broke out few decades after Carolus Clusius (1526–1609) became the first prefect of the Leiden botanical garden in 1593, where he planted his collection of tulip bulbs (Dash 2011). Because they were so different from other flowers known to Europe at the time, they soon grew in popularity and became a status symbol (Pavord 2019).

*Tulipa sylvestris* followed a different route than ornamental tulips: in 1753 Linnaeus described it as "wild", hence the name "sylvestris". It was introduced to Northern Europe from the Mediterranean region, and at the time of its description by Linnaeus the species was probably already naturalized. The introduction history of *T. sylvestris* in the 16th century has been traced in detail by Stefanaki et al. (2022), who also published a map with the distribution of the species in Europe. Following historical botanical texts, illustrations, and herbarium specimens, two main origins came up: Bologna in Northern Italy and Montpellier in Southern France (Stefanaki et al. 2022). The Flemish botanist Matthias de Lobel wrote about collecting bulbs in the Cevennes mountains north of Montpellier between 1565 and 1568 and sending them to Antwerp (De Lobel and Pena 1571). Those tulips were likely the indirect source used for the first scientific description of *T. sylvestris*, in the book *Florum* (Dodoens 1568), where a woodcut appears drawn after a watercolor from the *Libri Picturati* collection named "the small yellow tulip of Montpellier" (De Koning et al. 2008).

The Bologna tulip was first described by de Lobel in 1576 (de Lobel and Pena 1576). The Bolognese botanist Ulisse Aldrovandi seems to have played an important role in its spread to Northern Europe, as he sent bulbs to Clusius and possibly to more of his correspondents from the 1570s onwards. Two specimens dated 1552 and 1553 still survive in his vast herbarium collection (Soldano 2001, 2002). Another (third) introduction route points to the Apennines, as Clusius (1601) wrote that the tulip he received from Aldrovandi was growing abundantly in the Appennines. He first named it *Tulipa "Appeninea sive Bononiensis"*, and later "*Tulipa Appeninea*" (Stefanaki et al. 2022). Clusius generously distributed bulbs of both the Bologna and Montpellier tulips within his network, accompanied by information about how well they spread thanks to their stolons (Clusius 1577). Clusius also described a small yellow tulip similar to *T. Appeninea*, *Tulipa Hispanica*, which had been brought from Spain to Belgium by the royal gardener of the Spanish King Philip II. However, those tulips were harder to cultivate in the Belgian weather and they soon perished (Clusius 1601).

The wild tulips that naturalized throughout Europe are said to belong to the tetraploid *T. sylvestris* subsp. *sylvestris*, while plants native to the Mediterranean are of the diploid *T. sylvestris* subsp. *australis* (Link) Pamp., from which subsp. *sylvestris* was derived with autotetraploidization (Christenhusz et al. 2013). However, Stefanaki et al. (2022) showed that both subspecies were introduced to Northern Europe, namely the tetraploid subsp. *sylvestris* from Bologna and the diploid subsp. *australis* from the Cevennes and questionably the Apennines (Stefanaki et al. 2022). It is not clear, though, whether the Apennine origin was a misunderstanding by Clusius, because he united the Apennine and the Bologna origin ("*Tulipa Appeninea sive Bononiensis*") but the plants growing in these two areas are taxonomically distinct (subsp. *sylvestris* in Bologna and subsp. *australis* in the Apennines) (see Stefanaki et al. 2022).

*T. sylvestris* (subsp. *sylvestris*) thrives today in the Netherlands in sunny places in the so-called *stinzen-milieu*, which is rich in humus and contains some

calcium. It is still strongly connected to country estates, historical gardens, and graveyards. Less often it is found in other environments, such as woodland edges, sea dunes, and road verges (Bakker and Boeve 1985; FLORON 2023). Large populations of *T. sylvestris* are still present in historical gardens, striking examples being those at the Nyenrode castle in the province of Utrecht, and Dekemastate and Martenastate in Friesland. In the Netherlands (Friesland), and also in northern Germany and southern Denmark there are large wild populations growing along road verges (Willem van Riemsdijk, pers. communication). This is facilitated by the mowing regime (few times per year) that is nowadays common practice in many places.

The provenance of these naturalized populations remains unknown, and it is not documented whether they are linked to the original introduction routes from Bologna or Montpellier. No information about the tulips is found in the archives of the castles and estates where these populations grow, nor is their origin mentioned in historical botanical literature. Here, we attempt to elucidate the history of the wild tulip from the 17th to the 19th century, marking the period after the species' first introduction in the 16th century (Stefanaki et al. 2022) until it officially became established in the wild (FLORON 2023). Our focus is primarily on Dutch gardens, but additional sources from Northern European countries were also consulted to gain broader insights into the history of *T. sylvestris* in Europe.

## Materials and methods

We analyzed different historical sources on *Tulipa sylvestris* in the period between the 1600s and 1800s. We explored growers' and garden catalogues, botanical books, florilegia, herbaria, journal bulletins, seed lists of botanic gardens and gardens plans to trace who was planting and distributing *T. sylvestris* in this period. We divided this period into two sections marked by the publication of the *Species Plantarum* (Linnaeus 1753) where the name *T. sylvestris* was used first.

For the period 1600–1753, we considered the pre-Linnean names attributed to *T. sylvestris* (see Stefanaki et al. 2022), namely *Narcissus luteus, Lilionarcissus luteus, Lilionarcissus Bononiensis, Lilionarcissus Narbonensis, Tulipa Bononiensis, Tulipa Narbonensis, Tulipa Monspeliensis, Tulipa de Montepeliers, Tulipa van Boloignie, Tulipa Hispanica, Tulipa lutea, Tulipa Appeninea, Tulipa parva lutea, Tulipa minor, Tulipa minor lutea Italica, Tulipa minor lutea Gallica*. These terms (and *Tulipa sylvestris* for the period after 1753) were used to carry out a wide screening on the following search engines: Google books, Gelders Archive, Biodiversity Heritage Library, Archive.org to collect as many references as possible.

The Naturalis Bioportal (https://bioportal.naturalis.nl/en.) was scanned using the terms "Boerhaave", "Royen, A. van", "Royen, D. van", "Royen van", and "Meerburgh", to look for herbarium specimens of 17th-, 18th-, and 19th-century tulips. Other important herbarium collections of that time, namely the Linnaean collections and the Sloane, Clifford and Bergius herbaria were scanned for specimens of *T. sylvestris*. We also searched the extensive archives of seed lists and garden catalogues of the Utrecht University Botanic Gardens and the University of Padova botanic garden. Additionally, we looked for images of tulips in the digital art collection of the Rijksmuseum. To complete our survey of sources in Europe, we also took references from Northern Europe (predominantly from England, Scandinavia, and the German-speaking area) into account. Growers' catalogues cited in *Paradisus Batavus* were searched in the archives (Kuijlen et al. 1991).

Maps were created using Adobe Illustrator (2024, v 28.1.1) focusing on (i) pre-Linnaean names of *T. sylvestris* that contain a clear reference to the species' geographical origin (Italy/Bologna vs. France/Montpellier), (ii) the current versus historical occurrence of *T. sylvestris* in Friesland, the Dutch area where the species is most abundant. The current geographical distribution was obtained through FLORON (https://www.verspreidingsatlas.nl/planten.) and translated into a simpler version where the km-squares (1×1 km) were pictured as a dotted line.

## Results and discussion

### *The Netherlands before 1753*

In 1614, the yellow tulip appeared in a Dutch Florilegium, *Hortus Floridus*, by Crispijn van de Passe (1614), who was active in Utrecht at that period. Two names are given here, "*Tulipa Bononiensis*" and "*Tulipa de Montpeliers*", both accompanying a robust plant with three leaves and one flower (Figure 1; Table 1). van de Passe (1614) drew the plants from living individuals that were growing in the gardens of acquaintances, but no information is present regarding the exact locations.

The earliest 17th-century mention of *T. syvlestris* in the collection of a Dutch botanic garden is by the German physician and botanist Paul Hermann (1646–1695) who became Professor of Botany in Leiden in 1679. In his catalogue of the collections of the Leiden Hortus, *Horti Academici Lugudno-Batavi* (Hermann 1687) he includes a "*Tulipa minor lutea Italica*", referring to the *Pinax Theatri Botanici* by Bauhin (1623). It seems that the tulips were well established in the Leiden Hortus as they were still mentioned 32 years

**Table 1.** Overview of mentions of *Tulipa sylvestris* in botanical and horticultural literature in Europe in the 17th –19th century, in chronological order. Seedlist archives are checked until 1880.

| Title | Author | Date | Place | Type of evidence | Volume and page | Original name(s) | Source |
|---|---|---|---|---|---|---|---|
| Hortus Eystettensis | B. Besler | 1613 | Nuremberg | Text and image | 1, 17 | Text: Tulipa Apenninea, Bononiensis Image: Lilionarcissus Bononiensis | https://bibdigital.rjb.csic.es/idurl/1/10908. |
| Hortus Floridus | C. van de Passe | 1614 | Arnhem (Utrecht) | Text and image | 28 | Text: Tulipa tenuifol[ia] pumilio Narbonensis, Narbonensis vel Bononiensis & Apenninea Clusio. Image: Tulipa Bononiensis. Tulipa de Montpelliers, Tulipa pumilus | https://bibdigital.rjb.csic.es/idurl/1/13646. |
| Theatrum botanicum | J. Parkinson | 1640 | London | Image | 1342 | Satyrion sive Tulipa Bononiensis, The Bononian Tulipa. Satyrion sive Tulipa pumilio, The Dwarfe Tulipa | https://doi.org/10.5962/bhl.title.152383. |
| Florilegium renovatum et auctum | J. T. de Bry | 1641 | Frankfurt | Image | 122 | Tulipa lutea odorata, Tulipa Narbonensis [crossed out] Bononiensis praecox πολύανθος alijs Narbonensis | https://books.google.nl/books?id=sSwz5is7G2sC&hl=it&pg=PP7#v=onepage&q&f=false. |
| Phythologia | J. J. Becher | 1662 | Ulm | Text and image | 2, 612 | Narcissus, Tulipa Bononiensis | https://books.google.nl/books?id=-FlcAAAAcAAJ&printsec=frontcover&hl=it&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false. |
| Prealudia Botanica | R. Morison | 1669 | London | Text | 1, 213 | Tulipa Apenninea minor lutea Italica vulgò Bononiensis | https://books.google.nl/books?id=S1pOAAAAcAAJ&pg=PAPP7&redir_esc=y#v=onepage&q&f=false. |
| Horti academici Lugduno-Batavi catalogus | P. Hermann | 1687 | Leiden | Text | 612 | Tulipa minor lutea Italica πολύκλον[ος], Tulipa minor lutea Italica | https://bibdigital.rjb.csic.es/idurl/1/13585. |
| Sloane Herbarium | L. Plukenet | 1660–1706 | London | Specimen | HS83 f. 100 | Tulipa minor lutea Italica, Lilionarcissus Bononiensis, Tulipa Apeninea | https://data.nhm.ac.uk/dataset/2fb08750-054b-4445-a78a-4083a017417d/resource/28f40da1-2333-4132-9c18-d6fd8cbbb0f8/record/114858/1721401511907. |
| Botanologia, the English Herbal, Or History of Plants | W. Salmon | 1710 | London | Text and image | 1008 | Text: Second or Yellow Bolonian Satyrion or Tulip; Third or Dwarf Yellow Satyrion or Tulip. Image: Satyrion Boloniense, Tulip Bolonian; Saturion Dwarf, Tulip Dwarf. | https://doi.org/10.5962/bhl.title.7127. |
| Plantarum Historiae Universalis Oxoniensis | R. Morison | 1715 | London, Oxford | Text and image | 1, 400, 450 | Text: Tulipa minor lutea Italica πολύκλονος, nobis, Tulipa Appeninea; Tulipa minor lutea Gallica, minor Narbonensis. Image: Tulipa minor lutea Italica, Bononiensis quae plerumque polyclonos; Tulipa minor lutea Gallica, Narbonensis minor | https://bibdigital.rjb.csic.es/idurl/1/12520. |
| Index alter plantarum quae in Horto Academico Lugduno-Batavo aluntur | H. Boerhaave | 1727 | Leiden | Text | 2, 138 | Tulipa praecox lutea, Tulipa praecox flava, Bononiensis Lilio-Narcissus luteus sive Tulipa Boloniensis | https://bibdigital.rjb.csic.es/idurl/1/13593. |
| Flora Suecica | C. Linnaeus | 1745 | Leiden (Lund) | Text | 92 | Tulipa minor lutea Gallica, Tulipa Narbonensis, Lilionarcissus Narbonensis montanus, parva Tulipa; Wild-Tulpan | https://bibdigital.rjb.csic.es/idurl/1/11548. |
| Species Plantarum | C. Linnaeus | 1753 | Stockholm | Text | 1, 305 | Tulipa sylvestris; Tulipa minor lutea Italica, Tulipa minor lutea Gallica | https://doi.org/10.5962/bhl.title.37656. |
| Linnaean herbarium | C. Linnaeus | 17? | - | Specimen | LINN 425.1 | Tulipa sylvestris ("Habitat Monspelii, inque Apenninis, Lundini") | https://linnean-online.org/3824/#?s=0&cv=0&z=0.0401%2C-0.1589%2C0.708%2C0.6456. |

(*Continued*)

Table 1. (Continued).

| Title | Author | Date | Place | Type of evidence | Volume and page | Original name(s) | Source |
|---|---|---|---|---|---|---|---|
| Catalogus plantarum horti academici et agri | J. G. Zinn | 1757 | Göttingen | Text | 102 | Tulipa sylvestris, Tulipa minor lutea Italica, gallica, Monspelii | Padova archives |
| Hortus Kewensis | J. Hill | 1768 | London | Text | 356 | Tulipa sylvestris | Padova archives |
| Flora Danica | G. C. Oeder | 1770 | Copenhagen | Text and image | 3, 344, tab ccclxxv | Tulipa minor lutea, Tulipa sylvestris | https://bibdigital.rjb.csic.es/idurl/1/13382. |
| A catalogue of hot-house and green-house plants fruit and forest trees, flowering shrubs, herbaceous plants, trees and kitchen garden seeds, perennial and annual flower seeds, garden mats and tools | W. Malcolm | 1778 | London | Text | 1, 178 | Tulipa sylvestris | https://archive.org/details/bim_eighteenth-century_a-catalogue-of-hot-house_malcolm-william_1778/page/n177/mode/2up. |
| Natuurlyke Historie, of Uitvoerige Beschryving Der Dieren, Planten, en Mineraalen | M. Houttuyn | 1780 | Amsterdam | Text | 2.12:267 | Tulipa sylvestris, Tulipa minor lutea Italica & Gallica, Tulipa Narbonensis, Lilio-Narcissus luteus montanus et parva Tulipa | https://www.google.nl/books/edition/Natuurlyke_historie_of_uitvoerige_beschr/9lb-8JYH_ocC?hl=en&gbpv=1&dq=parva%20tulipa&pg=PP7&printsec=frontcover. |
| Hortus Kewensis; Catalogue of the plants | W. Aiton | 1789 | London | Text | - | Tulipa sylvestris, Italian Yellow Tulip | Padova archives |
| English Botany; Or, Coloured Figures of British Plants | J. Sowerby, J. E. Smith | 1790 | London | Text and image | 1, 63 | Tulipa sylvestris, Wild Tulip | https://bibdigital.rjb.csic.es/idurl/1/11302. |
| Bergius Herbarium | P. J. Bergius | c.1790 | Stockholm | Specimens | 1.3.8.65, 1.3.9.40, 1.3.9.48 | Tulipa sylvestris, Tulipa celsiana (=T. sylvestris subsp. australis) | http://sbt.bergianska.se. |
| Smith Herbarium, Linnaean collections | J. E. Smith | 1793 | Bury | Specimen | LINN-HS 589.1.1 | Tulipa sylvestris | https://linnean-online.org/34197/#?s=0&cv=0&z=0.087%2C0.641%2C1.3973%2C1.721. |
| Catalogus van allerhande harde, zoo in als uitlandsche boomen, heesters en plant-gewassen, benevens eene groote partij boom, heesters, planten, en bloem-zaaden | Z. Brakel | 1794 | Utrecht | Text | 45 | Tulipa sijlvestris [*sic*] | https://books.google.nl/books?id=4Fz6gjcWBI0C&printsec=frontcover&hl=it&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false. |
| Untitled (Catalogue of plants received at the Utrecht botanic gardens) | Anonymous | 1798 | Utrecht | text | - | Tulipa sylvestris | Utrecht archives |
| Catalogus van vaste planten voor de volle grond | H. van Lunteren | 1819? | Utrecht | Text | 17 | Tulipa silevestris [*sic*] | https://edepot.wur.nl/139313. |
| C. F. Hagenbach herbarium | C. Münch | pre 1821 | Weil am Rhein (Basel) | Specimen | | Tulipa sylvestris. Tulipa minor lutea Italica | Herbarium Basel, BAS-00008488 |
| A natural arrangement of British Plants | S. F. Gray | 1821 | London | Text | 2, 173 | Tulipa sylvestris, Wild Tulip, Tulipa Bononiensis, Tulipa sylvatica, Tulipa Turicia [*sic*], Italian tulip, Dalmatian cap | https://doi.org/10.5962/bhl.title.43804. |
| Flora Basileensis | C. F. Hagenbach | 1821 | Basel | Text | 1, 309 | Tulipa sylvestris, Tulipa lutea minor Gallica | https://doi.org/10.5962/bhl.title.6673. |
| Index Plantarum quae in Horto Rheno-Trajectino coluntur | J. Altheer | 1822 | Utrecht | Text | 22 | Tulipa sylvestris | Utrecht archives |
| An encyclopedia of gardening | J. C. Loudon | 1826 | London | Text | 874, 887 | Tulipa sylvestris | https://doi.org/10.5962/bhl.title.69191. |
| Flora Batava | J. Kops, H. C. van Hall, J. E. van der Trappen, P. M. E. Gevers Deynoot | 1828 | Amsterdam | Text and image | 3,377 | Tulipa sylvestris, Gele Tulp, Wilde Tulpe, Wild Tulip | http://biolib.de/batava/band5/index.html. |
| British Entomology | J. Curtis | 1834 | London | Image | 8 | Tulipa sylvestris | https://www.biodiversitylibrary.org/item/185436. |
| C. F. Hagenbach herbarium | C. F. Hagenbach | 1835 | Haltingen | Specimen | - | Tulipa sylvestris | Herbarium Basel, BAS-000084887 |
| Flora Metropolitana, botanical rambles within thirty miles of London | D. Cooper | 1836 | London | Text | 3 | Tulipa sylvestris | https://doi.org/10.5962/bhl.title.28755. |

(*Continued*)

Table 1. (Continued).

| Title | Author | Date | Place | Type of evidence | Volume and page | Original name(s) | Source |
|---|---|---|---|---|---|---|---|
| Delectus Seminum in Horto Botanico Vratislaviensi collectorum | Anonymous | 1838 | Breslau | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Index Seminum Horti Academici Rheno-Trajectini | C. A. Bergsma | 1838 | Utrecht | Text | 4 | Tulipa sylvestris | Utrecht archives |
| C. F. Hagenbach herbarium | C. F. Hagenbach | 1838 | Weil am Rhein | Specimen | | Tulipa sylvestris | Herbarium Basel, BAS-000084889 |
| Index Seminum Horti Academici Rheno-Trajectini | C. A. Bergsma | 1839 | Utrecht | Text | 5 | Tulipa sylvestris | Utrecht archives |
| Catalogue de graines récoltées au Jardin du Roi | Mirbel | 1839 | Paris | Text | 8 | Tulipa sylvestris | Utrecht archives |
| Flora Frisica | J. J. Bruinsma | 1840 | Leeuwaarden | Text | 66–7, 161 | Tulipa sylvestris | http://www.biolib.de/bruinsma/index.html. |
| Hortus Regius Monacensis seminifer | Anonymous | 1841 | München | Text | 5 | Tulipa sylvestris | Utrecht archives |
| Index Seminum Horti Bruxellensis | Anonymous | 1852 | Bruxelles | Text | 8 | Tulipa sylvestris | Utrecht archives |
| Semina collecta in Horto Groningano | Anonymous | 1852 | Groningen | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Index Seminum Horti Academici Rheno-Trajectini | C. A. Bergsma | 1852 | Utrecht | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Catalogue de graines récoltées au Muséum d'Histoire Naturelle de Paris | J. Decaisne | 1853 | Paris | Text | 2 | Tulipa celsiana (=T. sylvestris subsp. australis) | Utrecht archives |
| Index Seminum Horti Academici Rheno-Trajectini | C. A. Bergsma | 1853 | Utrecht | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Semina selecta quae hortus botanicus Imperialis Petropolitanus pro mutua commutatione offert | C. A. Meyer | 1853 | St. Petersburg | Text | 7 | Tulipa biebersteiniana (=T. sylvestris subsp. australis) | Utrecht archives |
| Index Seminum Horti Academici Rheno-Trajectini | C. A. Bergsma | 1854 | Utrecht | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Index Seminum Horti Bruxellensis | H. Galeotti | 1854 | Bruxelles | Text | 11 | Tulipa sylvestris | Utrecht archives |
| Delectus seminum in horto botanico Bonnensi | W. Sinning | 1854 | Bonn | Text | 3 | Tulipa turcica (=T. sylvestris subsp. sylvestris) | Utrecht archives |
| Semina collecta in horto Groningano | Anonymous | 1854 | Groningen | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Catalogue de graines récoltées au Muséum d'Histoire Naturelle de Paris | J. Decaisne | 1854 | Paris | Text | 3 | Tulipa celsiana (=T. sylvestris subsp. australis) | Utrecht archives |
| Hortus botanicus universitatis regiae Gryphicae mutuae communicationi offert | J. Münter, O. Dotzauer | 1855 | Greifswald | Text | 6 | Tulipa sylvestris | Utrecht archives |
| Semina collecta in horto Groningano | Anonymous | 1855 | Groningen | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Catalogue des graines récoltées au muséum d'histoire naturelle de Paris | J. Decaisne | 1855 | Paris | Text | 3 | Tulipa sylvestris, T. celsiana (=T. sylvestris subsp. australis) | Utrecht archives |
| Index Seminum Horti Academici Rheno-Trajectini | C. A. Bergsma | 1855 | Utrecht | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Semina collecta in horto Groningano | Anonymous | 1856 | Groningen | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Index seminum horti Bruxellensis | H. Galeotti | 1856 | Brussels | Text | 7 | Tulipa sylvestris | Utrecht archives |
| Catalogue de graines récoltées au Muséum d'Histoire Naturelle de Paris | J. Decaisne | 1856 | Paris | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Index Seminum quae hortus botanicus imperialis Petropolitanus pro mutua commutatione offert – semina in regione Wolgensi propre Sarepta lecta | E. Reger, F. Körnieke, L. Rach | 1856 | St. Petersburg | Text | 15 | Tulipa tricolor (=T. sylvestris subsp. australis) | Utrecht archives |
| Index Seminum Horti Bruxelliensis | H. Galeoti | 1857 | Brussels | Text | 7 | Tulipa sylvestris | Utrecht archives |
| Catalogus Plantarum quae in C. R. Horto Botanico Cracoviensi | I. R. Czerwiakowski, J. Warszewicz | 1864 | Krakow | Text | 32 | Tulipa sylvestris | Padova archives |
| Index Seminum horti academici Rheno-Trajectini | F. A. W. Miquel, G. van den Brink | 1864 | Utrecht | Text | 1 | Tulipa florentina (=T. sylvestris subsp. sylvestris?) | Utrecht archives |
| Delectus seminum in horto R. Botanico Monacensi collectorum | M. Kolb, C. Naegeli | 1865 | München | Text | 2 | Tulipa sylvestris | Utrecht archives |
| Catalogue de graines récoltées au Muséum d'Histoire Naturelle de Paris | J. Decaisne | 1865 | Paris | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Index Seminum in horto botanico regimontano collectorum | R. Caspary, H. L. Hanf | 1865 | Königsberg/ Kaliningrad | Text | 4 | Tulipa sylvestris | Utrecht archives |

(*Continued*)

**Table 1.** (Continued).

| Title | Author | Date | Place | Type of evidence | Volume and page | Original name(s) | Source |
|---|---|---|---|---|---|---|---|
| Catalogue de graines récoltées au Muséum d'Histoire Naturelle de Paris | J. Decaisne | 1865 | Paris | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Index Seminum horti academici Rheno-Trajectini | F. A. W. Miquel, G. van den Brink | 1865 | Utrecht | Text | 1 | Tulipa florentina (=T. sylvestris subsp. sylvestris?) | Utrecht archives |
| Index Seminum in horto botanico regimontano collectorum | R. Caspary, H. L. Hanf | 1866 | Königsberg/ Kaliningrad | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Delectus Seminum in horto botanico Universitatis Vindobonensis collectorum | E. Fenzl, F. Benseler | 1866 | Vienna | Text | 2 | Tulipa transtagana (=T. sylvestris subsp. australis), T. tricolor (=T. sylvestris subsp. australis) | Utrecht archives |
| Catalogue de graines récoltées au Muséum d'Histoire Naturelle de Paris | J. Decaisne | 1867 | Paris | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Delectus Seminum in Horto Botanico Academico Gissensi collectorum | H. Hoffmann, J. F. Müller | 1867 | Giessen | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Delectus Seminum in horto botanico Universitatis Vindobonensis collectorum | E. Fenzl, F. Benseler | 1867 | Vienna | Text | 2 | Tulipa celsiana (=T. sylvestris subsp. australis) | Utrecht archives |
| Index Seminum in horto botanico regimontano collectorum | R. Caspary, H. L. Hanf | 1867 | Königsberg/ Kaliningrad | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Delectus Seminum in horto botanico Universitatis Vindobonensis collectorum | E. Fenzl, F. Benseler | 1867 | Vienna | Text | 2 | Tulipa transtagana (=T. sylvestris subsp. australis) | Utrecht archives |
| Index Seminum in horto botanico regimontano collectorum | R. Caspary, H. L. Hanf | 1868 | Königsberg/ Kaliningrad | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Catalogue de graines récoltées au Muséum d'Histoire Naturelle de Paris | Anonymous | 1868 | Paris | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Auswahl von Sämereien in dem botan. Garten der Universität Würzburg gesammelt und zum Tausch angeboten | J. Sachs, C. Salomon | 1869 | Würzburg | Text | 1 | Tulipa celsiana (=T. sylvestris subsp. australis), Tulipa turcica (=Tulipa sylvestris subsp. sylvestris) | Utrecht archives |
| Catalogue de graines récoltées au Muséum d'Histoire Naturelle de Paris | J. Decaisne | 1869 | Paris | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Delectus Seminum collectorum quae mutuae commutation offert hortus botanicus Universitatis Dorpatensis | M. Willkom, E. Stelling | 1869 | Tartu | Text | 2 | Tulipa celsiana (=Tulipa syvlestris subsp. australis) | Utrecht archives |
| Delectus Seminum collectorum quae mutuae commutation offert hortus botanicus Universitatis Dorpatensis | M. Willkom, E. Stelling | 1870 | Tartu | Text | 2 | Tulipa celsiana (=Tulipa syvlestris subsp. australis) | Utrecht archives |
| Index Seminum in horto botanico Amstelodamensi | J. C. Groenewgen, C. A. J. A. Oudemans | 1871 | Amsterdam | Text | 4 | Tulipa florentina (=T. sylvestris subsp. sylvestris) | Utrecht archives |
| Delectus Seminum collectorum quae mutuae commutation offert hortus botanicus Universitatis Dorpatensis | M. Willkom, E. Stelling | 1871 | Tartu | Text | 2 | Tulipa celsiana (=Tulipa syvlestris subsp. australis) | Utrecht archives |
| Delectus Seminum in horto botanico Universitatis Vindobonensis collectorum | E. Fenzl, F. Benseler | 1871 | Vienna | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Index Seminum quae hortus botanicus imperialis Petropolitanus pro mutua commutatione offert – semina in regione Wolgensi inque desertis Caspicis a Cl. Beckero lecta | E. Reger, C. J. Maximowicz, E. Ender, H. Höltzer | 1871 | St. Petersburg | Text | 43 | Tulipa tricolor (=T. sylvestris subsp. australis) | Utrecht archives |
| Desiderata de l'École de Botanique de Rouen | E. Blanche | 1872 | Rouen | Text | 1 | Tulipa celsiana (=T. sylvestris subsp. australis) | Utrecht archives |
| Delectus Seminum in horto botanico Universitatis Vindobonensis collectorum | W. Hofmeister, W. Hochstetter | 1872 | Vienna | Text | 2 | Tulipa sylvestris | Utrecht archives |
| Auswahl von Sämereien aus dem botanischen Garten der k. Universität Erlangen | M. Reess, F. Francke | 1872 | Erlangen | Text | 3 | Tulipa sylvestris | Utrecht archives |

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Table 1. (Continued).

| Title | Author | Date | Place | Type of evidence | Volume and page | Original name(s) | Source |
|---|---|---|---|---|---|---|---|
| Catalogue des espéces offertes en échange par l'École de Rouen | E. Blanche | 1872 | Rouen | Text | 8 | Tulipa sylvestris | Utrecht archives |
| Delectus seminum que hortus botanicus imperialis Petropolitanus | E. Ender, H. Höltzer | 1872 | St. Petersburg | Text | 8 | Tulipa sylvestris var. minor (=T. sylvestris subsp. australis) | Utrecht archives |
| Catalogue de graines récoltées au Muséum d'Histoire Naturelle de Paris | J. Decaisne | 1872 | Paris | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Samen-Verzeichniss des botanischen Gartens der Universität Bonn | J. Hanstein, J. Bouché | 1872–3 | Bonn | Text | 2 | Tulipa florentina (=T. sylvestris subsp. sylvestris) | Utrecht archives |
| Hortus botanicus universitatis regiae Gryphicae mutuae communicationi offert | J. Münter, O. Dotzauer | 1873 | Greifswald | Text | 8 | Tulipa sylvestris | Utrecht archives |
| Delectus seminum in Horto botanico Carlsruhensi | C. Mayer, M. Seubert | 1873 | Karlsruhe | Text | 3 | Tulipa celsiana (=T. sylvestris subsp. australis) | Utrecht archives |
| Index Seminum in horto botanico regimontano collectorum | R. Caspary, C. Einicke | 1873 | Königsberg/ Kaliningrad | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Catalogue de graines récoltées au Muséum d'Histoire Naturelle de Paris | J. Decaisne | 1873 | Paris | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Index Seminum in Horto botanico Universitatis Caesareae Mosquensis | M. Wobst | 1874 | Moscow | Text | 11 | Tulipa sylvestris | Utrecht archives |
| Jardin botanique de Rouen: Supplément au catalogue de 1873, gaines récoltées en 1874 | E. Blanche | 1874 | Rouen | Text | 1 | Tulipa sylvestris | Utrecht archives |
| Index Seminum in horto botanico regimontano collectorum | R. Caspary, C. Einicke | 1874 | Königsberg/ Kaliningrad | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Auswahl von Sämereien aus dem botanischen Garten der k. Universität Erlangen | M. Reess, F. Francke | 1874 | Erlangen | Text | 2 | Tulipa sylvestris | Utrecht archives |
| Catalogue de graines récoltées au Muséum d'Histoire Naturelle de Paris | J. Decaisne | 1874 | Paris | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Index Seminum in Horto botanico Universitatis Caesareae Mosquensis | I. Tchistiakoff, M. Wobst | 1874 | Moscow | Text | 12 | Tulipa sylvestris | Utrecht archives |
| Hortus botanicus universitatis regiae Gryphicae mutuae communicationi offert | J. Münter, O. Dotzauer | 1875 | Greifswald | Text | 7 | Tulipa sylvestris | Utrecht archives |
| Samen-Verzeichniss des Botanischen Gartens zu Halle | G. Kraus, M. Paul | 1875 | Halle | Text | 2 | Tulipa sylvestris | Utrecht archives |
| Index Seminum in horto botanico regimontano collectorum | R. Caspary, C. Einicke | 1875 | Königsberg/ Kaliningrad | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Delectus seminum que hortus botanicus imperialis Petropolitanus | E. Ender, H. Höltzer | 1875 | St. Petersburg | Text | 9 | Tulipa sylvestris var. minor (=T. sylvestris subsp. australis) | Utrecht archives |
| Catalogue des gaines récoltées au jardin botanique de Rouen | E. Blanche | 1875 | Rouen | Text | 1 | Tulipa sylvestris | Utrecht archives |
| Index Seminum in Horto academico Hauniensi collectorum | T. Friedrichsen, F. Didrichsen | 1876 | Copenhagen | Text | 6 | Tulipa sylvestris | Utrecht archives |
| Delectus Seminum in Horto Botanico Academico Gissensi collectorum | H. Hoffmann, J. F. Müller | 1876 | Giessen | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Index Seminum in horto botanico regimontano collectorum | R. Caspary, C. Einicke | 1876 | Königsberg/ Kaliningrad | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Auswahl von Früchten und Saamen, gesammelt 1875 in dem botanischen Garten der Universität zu Leipzig | Schenk, F. Funck | 1876 | Leipzig | Text | 2 | Tulipa sylvestris | Utrecht archives |
| Catalogue des gaines récoltées au jardin botanique de Rouen | E. Blanche | 1876 | Rouen | Text | 1 | Tulipa sylvestris | Utrecht archives |
| Delectus seminum quae hortus botanicus imperialis Petropolitanus | E. Ender, H. Höltzer | 1876 | St. Petersburg | Text | 8 | Tulipa sylvestris var. minor (=T. sylvestris subsp. australis) | Utrecht archives |

(*Continued*)

**Table 1.** (Continued).

| Title | Author | Date | Place | Type of evidence | Volume and page | Original name(s) | Source |
|---|---|---|---|---|---|---|---|
| Delectus Seminum in horto botanico Universitatis Vindobonensis collectorum | F. Benseler, E. Fenzl | 1876 | Vienna | Text | 2 | Tulipa sylvestris | Utrecht archives |
| Index Seminum in Horto academico Hauniensi collectorum | T. Friedrichsen, F. Didrichsen | 1877 | Copenhagen | Text | 6 | Tulipa celsiana (=T. sylvestris subsp. australis), Tulipa sylvestris | Utrecht archives |
| Delectus Seminum in Horto Botanico Academico Gissensi collectorum | H. Hoffmann, J. F. Müller | 1877 | Giessen | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Catalogue des gaines récoltées au jardin botanique de Rouen | E. Blanche | 1877 | Rouen | Text | 1 | Tulipa sylvestris | Utrecht archives |
| Delectus seminum quae hortus botanicus imperialis Petropolitanus: Semina in Rossia australi, in Caucaso, in Sibiria collecta | E. Ender, H. Höltzer | 1877 | St. Petersburg | Text | 29 | Tulipa biebersteiniana (=T. sylvestris subsp. australis), Tulipa tricolor (=T. sylvestris subsp. australis) | Utrecht archives |
| Delectus Seminum in horto botanico Universitatis Vindobonensis collectorum | E. Fenzl, F. Benseler | 1877 | Vienna | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Auswahl von Sämereien Knollen & Zwiebeln in dem botanischen Garten der Universität Würzburg gesammelt und zum Tausch angeboten | J. Sachs, C. Salomon | 1877 | Würzburg | Text | 2 | Tulipa turcica (=Tulipa sylvestris subsp. sylvestris) | Utrecht archives |
| Hortus botanicus universitatis regiae Gryphicae mutuae communicationi offert | J. Münter, O. Dotzauer | 1878 | Greifswald | Text | 6 | Tulipa sylvestris | Utrecht archives |
| Catalogue des graines récoltées au jardin botanique de Nancy | G. Le Monnier | 1878 | Nancy | Text | 11 | Tulipa sylvestris | Utrecht archives |
| Delectus seminum quae hortus botanicus imperialis Petropolitanus pro mutua commutatione offert: Semina in Rossia australi, in Caucaso, in Sibiria collecta | E. Ender, H. Höltzer | 1878 | St. Petersburg | Text | 30 | Tulipa biebersteiniana (=T. sylvestris subsp. australis), Tulipa tricolor (=T. sylvestris subsp. australis) | Utrecht archives |
| Auswahl von Sämereien in dem botanischen Garten der Universität Würzburg gesammelt und zum Tausch angeboten | J. von Sachs, C. Salomon | 1878 | Würzburg | Text | 2 | Tulipa sylvestris | Utrecht archives |
| Selectus Seminum in Horto botanico Turicensi | O. Heer, E. Ortgies | 1878 | Zürich | Text | 2 | Tulipa sylvestris | Utrecht archives |
| Index Seminum in Horto academico Hauniensi collectorum | T. Friedrichsen, F. Didrichsen | 1879 | Copenhagen | Text | 6 | Tulipa celsiana (=T. sylvestris subsp. australis), Tulipa sylvestris | Utrecht archives |
| Auswahl von Sämereien aus dem Botanischen Garten zu Frankfurt am Main | H. T. Geyler, G. Perlenfein | 1879 | Frankfurt am Main | Text | 1 | Tulipa sylvestris | Utrecht archives |
| Catalogue des gaines récoltées au jardin botanique de Rouen | E. Blanche | 1879 | Rouen | Text | 1 | Tulipa sylvestris | Utrecht archives |
| Delectus seminum quae hortus botanicus imperialis Petropolitanus pro mutua commutatione offert: Semina in Rossia australi, in Caucaso, in Sibiria collecta | E. Regel, C. J. Maximowicz, A. F. Batalin, C. Winkler, E. Ender, H. Höltzer | 1879 | St. Petersburg | Text | 37 | Tulipa sylvestris var. tricolor (=T. sylvestris subsp. australis) | Utrecht archives |
| Delectus Seminum et Plantarum, quae Hortus botanicus Universitatis Rheno-Traiectinae pro mutua commutatione offert | N. W. P. Rauwenhoff, G. van den Brink | 1879 | Utrecht | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Auswahl von Sämereien in dem botanischen Garten der Universität Würzburg gesammelt und zum Tausch angeboten | J. von Sachs, C. Salomon | 1879 | Würzburg | Text | 1 | Tulipa sylvestris, T. sylvestris var. tricolor (=T. sylvestris subsp. australis) | Utrecht archives |
| Selectus Seminum in Horto botanico Turicensi | O. Heer, E. Ortgies | 1879 | Zürich | Text | 2 | Tulipa sylvestris | Utrecht archives |
| Index Seminum in horto botanico regimontano collectorum | R. Caspary, C. Einicke | 1880 | Königsberg/ Kaliningrad | Text | 4 | Tulipa sylvestris | Utrecht archives |

(*Continued*)

Table 1. (Continued).

| Title | Author | Date | Place | Type of evidence | Volume and page | Original name(s) | Source |
|---|---|---|---|---|---|---|---|
| Delectus Seminum et Plantarum, quae Hortus Botanicus Universitatis Rheno-Traiectinae pro mutua commutatione offert | N. W. P. Rauwenhoff, G. van den Brink | 1880 | Utrecht | Text | 3 | Tulipa sylvestris | Utrecht archives |
| Auswahl von Sämereien aus dem Botanischen Garten zu Frankfurt am Main | H. T. Geyler, G. Perlenfein | 1880 | Frankfurt am Main | Text | 2 | Tulipa sylvestris | Utrecht archives |
| Delectus Seminum in Horto Botanico Academico Gissensi collectorum | H. Hoffmann, J. F. Müller | 1880 | Giessen | Text | 4 | Tulipa sylvestris | Utrecht archives |
| Auswahl von Sämereien in dem botan. Garten der Universität Würzburg gesammelt und zum Tausch angeboten | J. von Sachs, C. Salomon | 1880 | Würzburg | Text | 2 | Tulipa sylvestris var. tricolor (=T. sylvestris subsp. australis) | Utrecht archives |
| Sämereien zum Tausch aus dem Königlichen botanische Garten der Universität Breslau | H. R. Goeppert, B. Stein, C. Lakowitz | 1880 | Wroclaw | Text | 1 | Tulipa sylvestris | Utrecht archives |
| Catalogue des grains du jardin botanique de Lyon | T. Denis, G. Dutailly | 1880 | Lyon | Text | 23 | Tulipa sylvestris | Utrecht archives |
| Catalogue des graines récoltées au jardin botanique de Nancy | G. Le Monnier | 1880 | Nancy | Text | 12 | Tulipa sylvestris | Utrecht archives |
| Graines récoltées au Jardin botanique de la ville d'Angers | M. Jolibois, E. Lieutaud | 1880 | Angers | Text | 18 | Tulipa sylvestris | Utrecht archives |
| Taschenbuch der Flora von Basel und der angrenzenden Gebiete des Jura, des Schwarzwaldes und der Vogesen: zum Gebrauche auf Botanischen Excursionen | F. Schneider | 1880 | Basel | Text | 276 | Tulipa sylvestris | Herbarium Basel |


Figure 1. *Tulipa sylvestris* in the *Hortus floridus* by Crispijn van de Passe (1614). Image credit: digital art collections Rijksmuseum, public domain.

later in the garden catalogue of Boerhaave (1727), but it can also be that they were reintroduced after Hermann. Boerhaave used several other names, *Tulipa praecox lutea, Lilio-narcissus luteus, Tulipa Bononiensis*. There are no images in the garden catalogue, but these probably refer to the yellow Bologna tulip.

## The Netherlands after 1753

After the publication of the *Species Plantarum* (Linnaeus 1753) the name *Tulipa sylvestris* became widely accepted and is used in most of the literature. The wild tulip appears under the same name in the *Encyclopedia of the natural world according to the system of Linnaeus* (Houttuyn 1780). The author noted that Linnaeus brought the French and the Italian tulip under one name. Houttuyn also mentioned, referring to Linnaeus that the species escaped the gardens and is now growing scattered in the wild in Central and Northern Europe.

*Flora Batava* was the first comprehensive attempt to document the wild flora of the Netherlands. It has been described as more than just a Dutch flora, but rather a long-lasting loving tribute to it (Van Gelder and Peters 2023), with 28 volumes published between 1800 and 1934. In the edition of 1828, we find a beautiful illustration of *T. sylvestris* (Figure 2). *Flora Batava* contains one of the earliest traceable records of the species described as naturalized in the Netherlands: "*het [. . .] blijkt, dat zij hier als waarlijk inlandsch moet gerekend worden heft men haar ook reeds als zoodanig in Engeland erkend*" ("*it* [. . .] *seems that we should also count it as native as people have also recognized in England*") (Kops and van Hall 1828, p. 236). The species was for the first time reported to be growing wild around 1770 at Hagestein, a former castle in the vicinity of Vianen, Utrecht, in several localities in Friesland, and in Hoorn (Noord-Holland), growing at the side of the road (Kops and van Hall 1828).

The species does not appear in the first edition of *Flora Frisica* (Meese 1760), possibly because it was not yet seen as a wild or naturalized plant, or maybe it was overlooked. It is included in the edition of 1840, with more locations in Friesland: "*in Ferwerderadeel, and in Weidum, in the Prinsentuin in Leeuwarden, and at Huisum or Sixma State, in Stiens, in Jelsum and abundant in Kornjum under the trees*" (Bruinsma 1840, p. 67) (Figure 3).

The plant had also reached the growers' circles as it started to appear in gardens, such as the nursery Tulpenburg in Utrecht, owned by Zacharias Brakel (1794). Even if the title "*of hardy foreign plants*" suggested non-native plants, the tulip was mentioned as


Figure 2. Illustration of *Tulipa sylvestris* published in *Flora Batava* (1828), Vol. 5, plate 377. Image credit: The Hague, KB National Library of the Netherlands, KW T 423.


**Figure 3.** Among the oldest still extant wild populations of *Tulipa sylvestris* in the Netherlands are those in Martenastate, Cornjum (a) and Dekemastate, Jelsum (b) in Friesland, mentioned in *Flora Frisica* from 1840.

wild, which indicated that it was already considered naturalized by some people in the period before the publication of the *Flora Batava*. The species is named *sijlvestris* and appears yet with another spelling, *silevestris*, in the catalogue of Hendrik van Lunteren, which was possibly compiled in 1819 (van Lunteren 1819?; Woerdeman 2009). Van Lunteren had established a nursery known as the "Flora Hof" at the Servetstraat in Utrecht in 1803, which remained a family business until 1934. He and his son Samuel van Lunteren (1813–1877) were successful plant growers and landscape architects, as it is shown by their broad oeuvre (Waanders 2000). Given it bears his signature, we can assume that this catalogue was published before the death of van Lunteren in 1848. Unfortunately, we could not find any catalogue of the nursery *Wybrens & Co* in Journe, Friesland. Van der Ploeg (1988) however mentions a relic population of *T. sylvestris* growing in the place where the nursery used to be.

## The German-speaking area

Approximately 35 engraved plates in the *Florilegium renovatum et auctum* by the famous engravers Dirk and son Johann Theodor de Bry, active in Frankfurt around 1600, depict bulbous and exotic plants, one of which contains a three-flowered specimen of *T. sylvestris* named "*Tulipa lutea odorata Bononiensis praecox πολύανθος [polýanthos = many-flowered] alijs Narbonensis*" (de Bry 1612). It seems that the plant was growing at the Nuremberg botanical garden, as it appears in the *Hortus Eystettensis* (Besler 1613). This beautiful publication, containing more than 1000 engravings of the plants found in the garden of Eichstätt, was commissioned by the prince-bishop of Eichstätt in Bavaria to the pharmacist and botanist Basilius Besler. Among the engravings is a three-flowered specimen of *T. sylvestris* named "*Lilio-Narcissus Bononiensis*" (Besler 1613).

The species also appears under the name "*Tulipa Bononienis*" in *Phytologia* (Becher 1662), a publication on medicinal plants, with a description of its wound-healing properties. It is again depicted as three-flowered.

Even though also the Montpellier tulip had reached Germany in the 16th century (Clusius 1577; Camerarius 1588; Stefanaki et al. 2022), it is mostly the Bologna tulip that appears in German literature in the period 1600s–1800s.

In 1821, the species was reported to grow wild in and near Basel (Hagenbach 1821). Three specimens collected around the same period in the vicinity of the city survive in Hagenbach's herbarium from 1835 (Figure 4). Hagenbach linked the species to its French origin, referring to Bauhin's *Tulipa lutea minor Gallica*. The species became naturalized in the surroundings of the city probably after the death of Caspar Bauhin (1560–1624), as he did not mention it in his flora of Basel (Bauhin 1622; Stöcklin and de Vos 2022).

## England

The first mention of *Tulipa sylvestris* appears in *The Herball*, published by John Gerard (1597). A few decades later the plant made its way in both publications of Robert Morrison (1620–1683). The *Prealudia Botanicorum* points to the Italian origin as it only includes the name "*Tulipa Appeninea Clus. minor lutea Italica, B. pin. vulgò Bononiensis*" (Morrison 1669), but in the *Plantarum Historiae Universalis Oxoniensis* we find two images, one as "*Tulipa minor lutea Gallica, Narbonensis minor Dod.*", depicting a single-flowered slender exemplar, and a robust three-flowered one as "*Tulipa minor lutea Italica, C.B.P. Bononiensis*" (Morrison 1715). Morrison referred to Clusius and Aldrovandi for the *Italica* tulip, describing that it was more robust and grew more easily than others. He connected the *Gallica* tulip to Dodoens and De Lobel, mentioning that the latter had sent bulbs to Belgium.


Figure 4. Specimen of *Tulipa sylvestris* collected by Christian Münch in the vicinity of Weil am Rhein, probably before 1821, in the herbarium of C. F. Hagenbach, Basel Herbaria. Image by Aurélie Grall, published with permission.

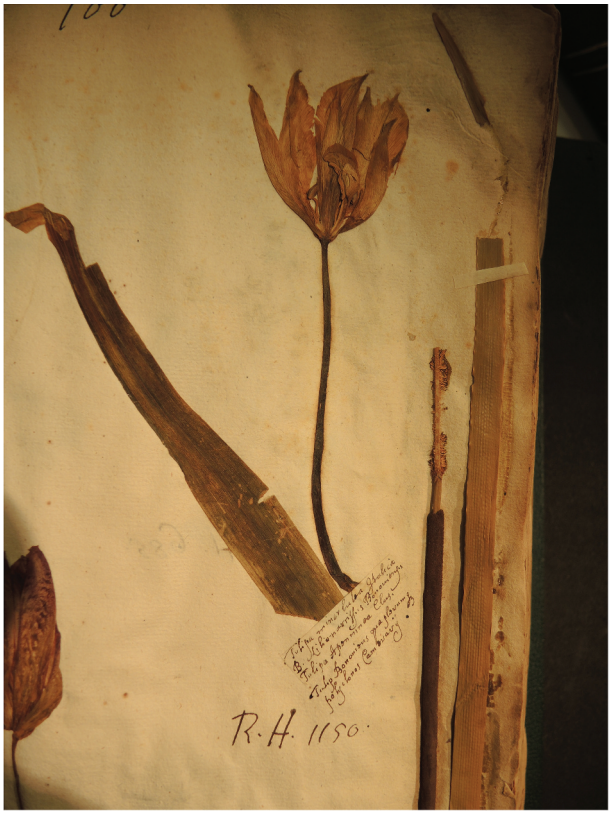


Figure 5. Specimen of *Tulipa sylvestris*, dated ca. 1660–1706, in the Sloane herbarium as part of Leonard Plukenet's collection, HS83 f. 100, Natural History Museum London. Image by Brad Scott, published with permission.

A specimen of *T. sylvestris* named "*Tulipa lutea Bononiensis*" dated 1660–1706 (Figure 5) is present in the Sloane herbarium (Scott et al. 2025) as part of the collection of Leonard Plukenet, gardener to Queen Mary II (1662–1694). Plukenet (1642–1706) most likely collected this specimen somewhere between the 1670s and 1690s while working on his *Phytographia* (1691) (Brad Scott, pers. communication). The stolons and roots of the species attracted the attention of Willem Salmon, who included it in his *Botanologia as "Satyrion Boloniense* or *Tulip Bolonian"* (Salmon and van der Gucht 1710). The presence of a plant carrying the epithet *sylvestris* in a catalogue of William Malcolm (1778) implied that it was known and widely cultivated at the time.

The plant is described for the first time as naturalized in England by Sowerby and Smith (1790). In the description of the plate included in their *English Botany*, they wrote: *"No writer on British plants has hitherto noticed the wild tulip; but we are encouraged to give it as a native, or at least a naturalized species by the observation of W. Mathew who favoured us with this specimen from an old chalk pit near Bury, as well as by the opinion of the late very accurate and learned Mr. Rose of Norwich, and of Dr. Mr. Smith who have both found it in an old chalk pit near the city"* (Sowerby and Smith 1790, p. 236). A specimen preserved in the herbarium of James Edward Smith (1759–1828) was collected in 1793 near Bary, probably in the same location. However, the plants probably vanished from this location in the 19th century (Henslow and Skepper 1860; Mark Spencer, pers. communication). In the *Flora of Suffolk* the species is reported to grow in Rougham (Henslow and Skepper 1860). The plant grew around London, in Lord Spencer's Park, as it is noticed by both Curtis (1834) in his *British Entomology* and in the *Flora metropolitana by* Daniel Cooper (1836). A population at Harefield in NW London is known to still be present since that period, namely for at least 150 years (Marks Spencer, pers. communication). The species also made it to the growers' and garden enthusiasts' circles, as it appears in *An encyclopedia of gardening*, where it is described as an ideal plant for the English landscape garden (Loudon 1826).

## Scandinavia

Linnaeus (1745) is the first to describe the naturalization of the wild tulip in Scandinavia in his *Flora Suecica*. He describes it as growing abundantly around Lund, stating that it was probably brought there by the bees and subsequently managed to settle. He

mentioned only the epithets *Gallica* and *Narbonensis*, pointing to the French origin. The plant is also present in the third volume of *Flora Danica* published in 1770 in Copenhagen (Oeder 1770). It is described as slender, with one flower. The epithet "*minor lutea*" is also added, and it is stated that the plant is found around Copenhagen castles, on walls, and in some gardens, and that it can be counted as native (Oeder 1770). The Bergius herbarium, dating from around the same time (1780) and originating from the collections of Peter Jonas Bergius (1730–1790), professor in Stockholm, contains three specimens of *T. sylvestris*, all of them quite slender and single-flowered.

Scandinavian references point to a French origin in either the epithet used or in the way the plant is depicted. This is unusual, as the Bolognese origin is usually mentioned in literature from other countries. In the *Species Plantarum* (Linnaeus 1753) both the Bologna and the Montpellier tulip are grouped together under the name of *T. sylvestris*, but it is questionable whether the Bologna tulip was growing in Sweden, as Linnaeus was also active in Leiden, the Netherlands, and had done work for his publication there.

A summary of all the sources used can be found in Table 1, ordered chronologically. Historical sources mentioning Pre-Linnaean names that are indicative of the place of origin (Italica, Bononiensis, Bologna vs. Gallica, Monspelliensis, Montpellier) are shown with date and location in Figure 6.

### Link between historical occurrence and present-day distribution in the Netherlands

Most historical references of *T. sylvestris* in the Netherlands describe locations in the province of Friesland. When we overlay them to the present day distribution map of the species (FLORON 2023) we

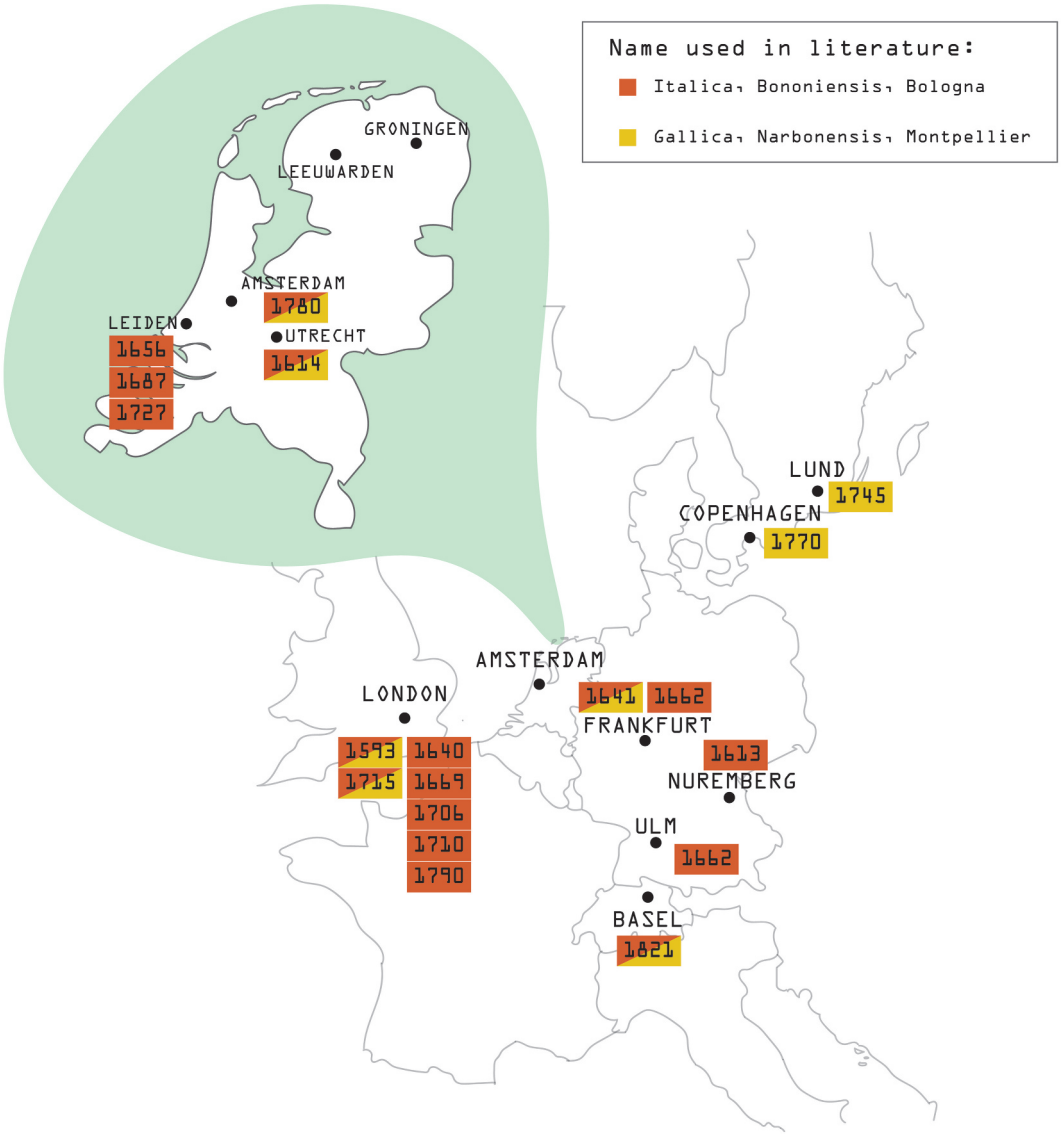


Figure 6. Map of historical locations from sources mentioning *Tulipa italica (Bononiensis, Bologna)* in red and *Tulipa Gallica (Narbonensis, Montpellier)* in yellow. Sources mentioning double origin have both colors. The dates correspond to the nearest cities on the map. The dominance of the red color shows the persistence through time of the Italian/Bologna origin for *Tulipa sylvestris*.

notice a clear coincidence between historical mentions and current occurrence (Figure 7). The distribution pattern coincides with the stinzen milieu which is still present in historical gardens and with the soil history that led to the formation of this environment. The wild tulip is known for its preference for vegetative over sexual reproduction. It is also characterized by poor flowering in shadier areas: even in optimal conditions, at best a quarter of the total population flowers (FLORON 2023). If pollinated, it sets seeds poorly, maybe due to its ploidy (Te Beest et al. 2012). Its strong vegetative reproduction was described already by Clusius (1577), who advised to plant those bulbs in a separate section or to use rooftiles as a separation, as they spread quite vigorously through their stolons. It therefore seems plausible that populations of *T. sylvestris* have managed to establish themselves and thrive locally around the locations where they were planted, but not much further than that, as that usually requires dispersal by seed.

Similar findings are reported from Northwestern Germany, where the current distribution of *T. sylvestris* aligns with the historical and cultural patterns of introductions in gardens (Kowarik and Wohlgemuth 2006). Plausible mechanisms mentioned for the spread of the species there include the disposal of vegetative parts with waste, hydrochory (i.e. transport of bulbs through water), hemerochory (transport by sticking to an object such as agriculture machines) or spread through the trade of grapevine plants and plowing of vineyards. Those mechanisms of dispersal seem plausible for the Netherlands as well: tulips could spread from re-used soil by growers, or during renovations of stinzen, estates and castles. Hydrochory may locally also explain the species' spread, e.g. in the province of Zeeland, where current locations seem to follow the waterline (Stikvoort et al. 2017). In Utrecht, *T. sylvestris* is mostly located around the Vecht river, which might also suggest hydrochory. However, that can also be linked to the soil geology and history, and to the establishment of castles and estates in the area around 1800, with gardens in landscape style. Another hypothesis for some plants found in Groenlo suggested that these might have been accidentally brought through crop import from southern Europe (Gleichman 1972).

Historical gardens in the Netherlands unfortunately do not have recorded information on the origin of their tulips. In an attempt to trace the history of these gardens, the names of certain landscape architects and gardeners appeared: some sources attribute the laying out of the park of Nyenrode castle in Utrecht to Samuel van Lunteren in 1861, but this is debated (Waanders 2000). For the Dekemastate in Friesland, the only information available about their garden in the period 1600s–1800s was that J.G. Selmer was responsible for the maintenance at the beginning of 1700, but at that time *T. sylvestris* was not yet widely distributed (Kuiper and Cuperus 2020). We do find the yellow tulip in many gardens realized by Lucas Pieters Roodbaard (1782–1851), such as the

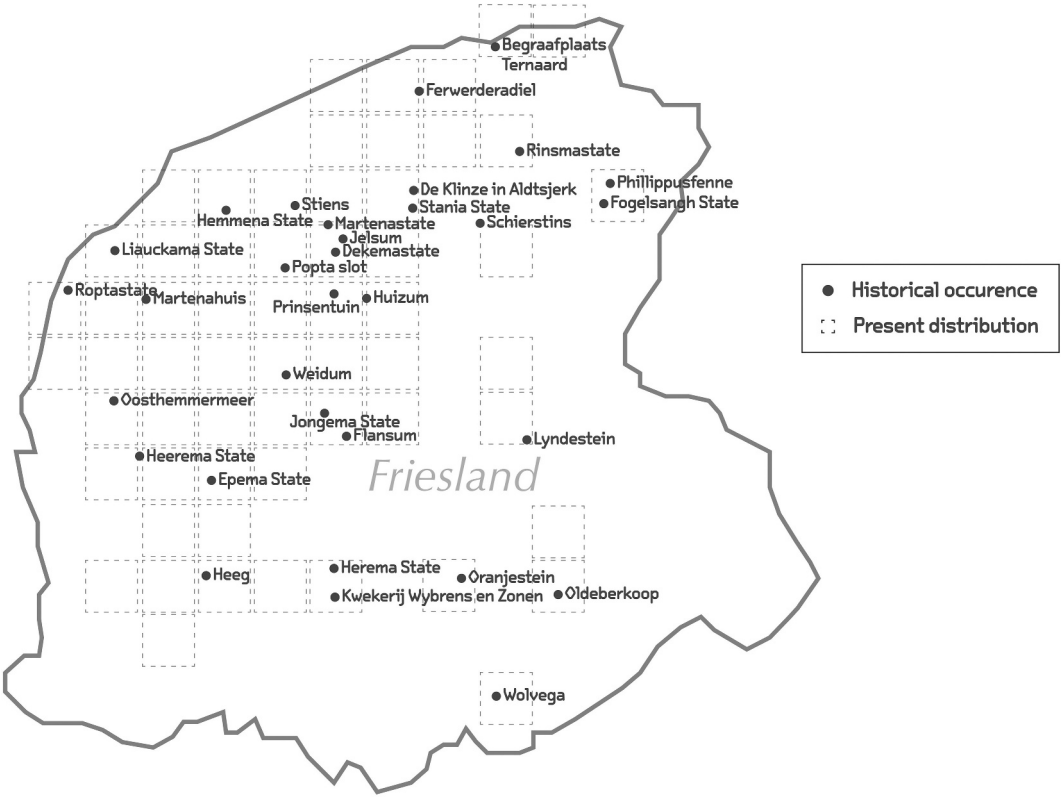


**Figure 7.** Historical locations of *Tulipa sylvestris* in Friesland, the Netherlands (Kops and van Hall 1828; Bruinsma 1840; van der Ploeg 1988; Buith et al. 2020) overlayed with the species' present distribution (FLORON, 2023).

Prinsentuin, Martenatuin, Martenastate, Dekemastate, Poptaslot and Epemastate (Buith et al. 2020). He obtained plants from the growers Wybrens & Co, and even though no catalogue of this firm is available, a population of wild tulips was present at the former location of their nursery (der Ploeg Dte 1988). Unfortunately, no tulip is mentioned in a series of surviving letters between Wybrens and Roodbaard to support this hypothesis (van der Spoel-Walvius Mr 2012).

## Conclusion

The introduction history of *T. sylvestris* in Europe after 1600 shows that the species' present occurrence is linked to previous human activity, especially in the context of cultural and historical landscapes, as it is often the case with stinzen plants. Based on historical evidence presented here, it becomes evident that *T. sylvestris* remained in cultivation in the Netherlands and Northern Europe throughout the 17th to the 19th century. The species started being reported as wild from 1745 onwards in Sweden, ca. 1777 in the Netherlands and 1790 in England.

Based on our findings, out of the two original places of introduction in the 16th century, Italy (*Bologna*) and France (*Montpellier*), the provenance that comes up the most is the Italian (Bologna) one, especially in the Netherlands, Germany, and England. The Apennines origin, a third one suggested by Clusius, is hardly mentioned.

The success of the Bologna tulip, which belongs to the autotetraploid subsp. *sylvestris*, vs. the Montpellier tulip, which in turn belongs to the diploid subsp. *australis*, can be assigned to the more robust habit of subsp. *sylvestris*, related to its tetraploid nature: larger leaves, usually two (sometimes three) flowers instead of one, and a bigger habit. Polyploids are also known to have a larger spread and a better colonization ability than their diploid counterparts. Besides the change in morphology, polyploids also have better stress tolerance and increased vegetative over sexual reproduction (Te Beest et al. 2012). These factors might have made the Bologna tulip more resilient and persistent throughout the centuries and made its spread easier. Interestingly, slender specimens of French (Montpellier) origin predominate in Scandinavian literature. The persistence of the French tulip in Sweden, despite the harsher climate, might be connected to the trade between the two countries since 1500: by the 18th century, the French language and culture had become such a big influence in Sweden that royals often received a French education (Pourchasse 2006).

Around the mid-19th century, *T. sylvestris* appeared in the seed lists of many botanic gardens, we can therefore assume that the species was potentially widely exchanged within Europe during that period. It is interesting that subsp. *australis* also appears in these seed lists (under synonyms, such as *T. celsiana* and *T. tricolor*). This shows that, besides subsp. *sylvestris*, also subsp. *australis* was cultivated in botanic gardens and exchanged among them. Still, it is not clear if and to what extent the exchanged plants (subsp. *sylvestris* or subsp. *australis*) escaped from botanic gardens and contributed to the naturalization of the species in the wild.

Although our search for historical sources was thorough, it was inevitably limited by the availability of sources online. Although the digitization of historical archives has been extensive in recent years, archives of historical garden catalogues and seed lists still remain scarce online. We therefore emphasize the importance of garden archives for historical research and the need to make more of these archives available online, as these are indispensable sources for understanding past movements of plants and their history of introduction.

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No potential conflict of interest was reported by the author(s).

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## Author contributions

AS and TvA designed the research; GC, AS and AO carried out research; GC wrote the manuscript; All authors read and commented on the manuscript.

## Data availability statement

All research data associated with this paper are included in the paper.

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