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# To know diverse manner of weeds: the development of weed identification manuals in early modern England and their influence on North American guides

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**Abstract**

The history of weed science as a discipline has been a topic of interest for decades, but it is rare for researchers to consider publications prior to the 19th century or that were not focused on North America. In this article, the development of weed identification manuals in early modern England is documented out of two genres of premodern scientific writing: agricultural treatises and illustrated herbals. These two forms of writing intersected in the late 18th century with the publication of Thomas Martyn's four-volume *Flora rustica*, an illustrated guide to plants in British agricultural systems. We argue that the key characteristics of modern North American weed identification guides in English (the use of the term *weed* to categorize plants, descriptions of plant habitats, and the use of detailed descriptions and/or illustrations of plants for identification purposes) originated in these premodern texts.

**Introduction**

Interest in the history of the discipline of weed science has focused primarily on the United States and Canada in the 19th and 20th centuries and has generally focused on weed control methods and regulations (Evans 1996, 2002; Timmons 1970; Young 1988) or on biographies of individual weed scientists (Anonymous 2019; Byrd et al. 2023, 2024; Zimdahl 2010). Histories of weed science in Europe are more limited and tend to focus on the development of modern weed management techniques or the origins of 20th-century scholarly weed science communities, such as the Weed Research Organization or the European Weed Research Society (Froud-Williams 2017). However, weeds have been present in cropping systems throughout history, as shown by archaeological evidence (Wolff et al. 2022). One difficulty in studying the history of weeds is in understanding how people in the past conceptualized weeds as a practical category (Wolff 2024). One approach to accessing this sort of knowledge is through premodern scientific botanical and agricultural writing. In more modern periods, this might take the form of works explicitly labeled and categorized as weed identification manuals (e.g., Neal et al. 2023). But even before this genre of scientific writing became formalized and popularized in the 19th century, agricultural writers were concerned with identifying and eliminating or managing weedy species, while medical writers were interested in identifying and locating plants with useful medicinal properties; frequently, these writers were interested in the same plants. For example, charlock [*Mutarda arvensis* (L.) D.A. German] is mentioned in early modern agricultural treatises and many contemporary medical texts. Defining the qualities that allow a piece of writing to be categorized as a weed identification manual is a surprisingly difficult task. Ultimately, this article considers a weed identification manual to be a text that applies the theoretical concept of the weed to actual plants by grouping specific species under the category of “weed” and provides some sort of description and/or illustration of the plants in question. Additionally, a weed identification manual is a text in which the weeds are the primary focus of the whole work. The texts outlined here do not all follow this second qualification, but their careful attention to precise descriptions of weedy plants in agricultural contexts certainly falls in line with the first qualification and offers a glimpse into precursors to the weed identification manuals that proliferated globally from the 19th century onward.

**Agricultural Writing: 1523 to 1788**

Between the 16th and 18th centuries, agriculture in England underwent numerous institutional and technological transformations (Allen 1992). Crop yields significantly improved throughout the 16th century, leading to a 71% increase in population (Allen 1999; Lowry 2003). Yields continued to improve in the 17th century, doubling between 1520 and 1651 (Allen 1999;

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Wilson 1984). After enclosure began in earnest in 1700, farm sizes grew dramatically (Allen 1988). Additionally, literacy rates among the farming classes increased over this period, creating a new audience for writing on agricultural topics (Lowry 2003). It is in this postmedieval period that weeds become part of the conversation in agricultural manuals. Agricultural writing has a long history in England dating back to the medieval period, but clear identification of plant species as weeds does not become part of the tradition until the 16th century, when Sir Anthony Fitzherbert (1470 to 1538), a judge in the English courts, succeeded his father as Lord of Norbury. As a wealthy country gentleman, he could afford to experiment with various agricultural practices without worrying about failure, leading to the 1523 publication of his agricultural treatise titled *The Boke of Husbandry* (Fitzherbert and Skeat 1882; see also Fussell 1947). While this text does not focus solely on arable agriculture, touching also on topics ranging from horse breeding to managing household accounts, it does contain a single chapter titled “To Knowe Dyuers Maner of Wedes” (To know diverse manner of weeds). In a short passage, Fitzherbert states that in late May and early June, one should prepare to “wede thy corne” and describes ten types of weeds found in the wheat fields, many of which can be identified from his short statements. For example, he offers the following description of corn cockle (*Agrostemma githago* L.): “Cockle has a long small leaf, and will bear five or six flowers of purple color, as broad as a groat, and the seed is round and black.” Although the English word *cockle* in this period can refer to either darnel (*Lolium temulentum* L.) or corn cockle, Fitzherbert’s description of the purple flowers clearly identifies this plant as the latter.

Other plants are more difficult to identify, as Fitzherbert uses more obscure names. For example, he lists a plant that seems to match the description of cornflower (*Centaurea cyanus* L.), as he describes it as having “a blue flower, and a few little leaves, and has five or six branches, flowered in the top,” but he names it as “hawdod,” a plant name found in only one other source in the early modern English corpus (Biggam 1994). Similarly, his description of wild oat (*Avena fatua* L.) uses the word “drake” to identify the plant, a word that in Middle English can refer broadly to weeds, to darnel, or to corn cockle, as well as to wild oat. The identification with wild oat is secure in this context due to the description of the plant (it “is like unto rye, until it begins to seed, and it has many seeds like fennel-seeds, and hangs downward, and it may well be suffered in bread, for there is much flour in the seed: and it is an opinion that it comes from rye”) and the identification of corn cockle and darnel separately within the larger passage.

Many subsequent early modern agricultural treatises identify specific plants as weeds without offering detailed descriptions of those plants, such as works by Gervase Markham (1614, 1620), Samuel Hartlib (1651), Walter Blith (1653), John Smith (1673), Leonard Meager (1697), Timothy Nourse (1700), John Laurence (1727), and Richard Bradley (1727). Markham (1614) is an exception in some cases, describing common knotgrass (*Polygonum aviculare* L.) as “a long running weede with little round smoth leaues, and the stalke very knotty and rough winding and wreathing one seame into another very confusedly, and groweth for the most part in very moist places,” but generally he offers only the names of plants and describes each as either a “weede” or an “hearbe.” There is an acknowledgment by some of these authors that different environments produce different weeds; Markham (1620, 7) states that ground that lacks grass but produces “Hemblocke, Docks, Mallowes, Nettles, Ketlocks, and such like” is good for cereals, as is ground that produces “Reede, Rushes,

Clouer, Daysie, and such like,” while Smith (1673, 32) similarly states that some soils “naturally produce Weeds, as Mallows, Nettles, Docks, Hemlocks” and others grow “Daisies, Clover, Charnock, Mustardseed, Rushes, &c.” Overall, these works from the 17th century do not provide descriptions of weedy plants, nor do they provide any attempts at comprehensive listings of weed species and methods of control.

One text that does not quite fit into the pattern laid out by other 17th-century agricultural manuals is *The Art of Simpling* by William Coles (1657). More a botanical manual than an agricultural treatise, this book suggests a division between weeds (“Chickweed, horehound, Archangell, Cleavers, Grounsell, Nettles, Hemlock, Bindweed, Poppy . . . Cockle, Mayweed, etc.”), useful plants found in the fields (“Tormentill, Agrimony, Fluellin Woodsorrell, etc.”), and grasses (“Satyrions, Knapweed, Scabious, Yarrow, Pearl-grasse, Dog-grasse, Trefoile, Daysies, Crowfoot, Ladies Bedstraw, etc.”) (16). Plants found “amongst the corn” are listed as “Blewbottles, Poppies, Restharrow, Fumitory, Shepherds needle, Mayweed, Cockle, Corne Marigold, Pimpernell, Cowparsnep, bindweed, Sow-Thistles, etc.” (18). None of these plants receives a detailed description, but the distinction drawn between weeds, useful plants, and grasses and the identification of plants found in arable fields indicate the application of the concept of the weed by early botanists and provide insight into what weedy plants may have been present in 17th-century fields.

In the mid-18th century, there was increased interest in identifying specific plants as weeds. William Ellis (1741) included a chapter on “Weeds, and Their Cure” in volume 5 of his treatise *The Modern Husbandman*. This volume, which provides advice for farmers in the month of May, advertises two new types of plows for weed control (conveniently for sale through Ellis’s own business) and describes 29 types of weeds, including many (but not all) of those found in Fitzherbert’s text. (See Table 1 for a summary of weeds that appear in multiple manuals.) Unlike Fitzherbert, Ellis was a farmer rather than a country gentleman, and the more extensive list of weedy plants may reflect his familiarity with his fields (Thick 2022). The 1758 edition of Thomas Hales’s *The Compleat Body of Husbandry*, which spans four volumes and more than a thousand pages, similarly contains a section in the third volume dedicated to weed control. The grouping of specific species itself is not intended to be comprehensive but instead offers a beautifully detailed page of black-and-white illustrations of common weed species categorized by annuals and perennials (485). In his 1759 continuation of his treatise, he goes on to outline the uses of various “unregarded” plants. Although he does not name these plants to be weeds as a group, certain examples, such as bastard alkanet [*Buglossoides arvensis* (L.) I.M. Johnst.], are named as such (56).

A more botanically inclined text from the mid-18th century is another clear example of a forerunner to the modern weed identification manuals. Bradley’s (1747) *Dictionary of Plants* gives detailed descriptions of several species identified in agricultural sources as weeds, although the dictionary itself is not consistent in the application of that term. For example, common groundsel (*Senecio vulgaris* L.) is identified as an “evil Weed” in the second volume of the dictionary, while other plants, such as corn marigold [*Glebionis segetum* (L.) Fourr.], which is identified as a weed in texts as early as Fitzherbert, in volume 1 is not given that label.

*The Complete Farmer* (Anonymous 1766) offers an even more detailed look at weeds and weed control in early modern England.

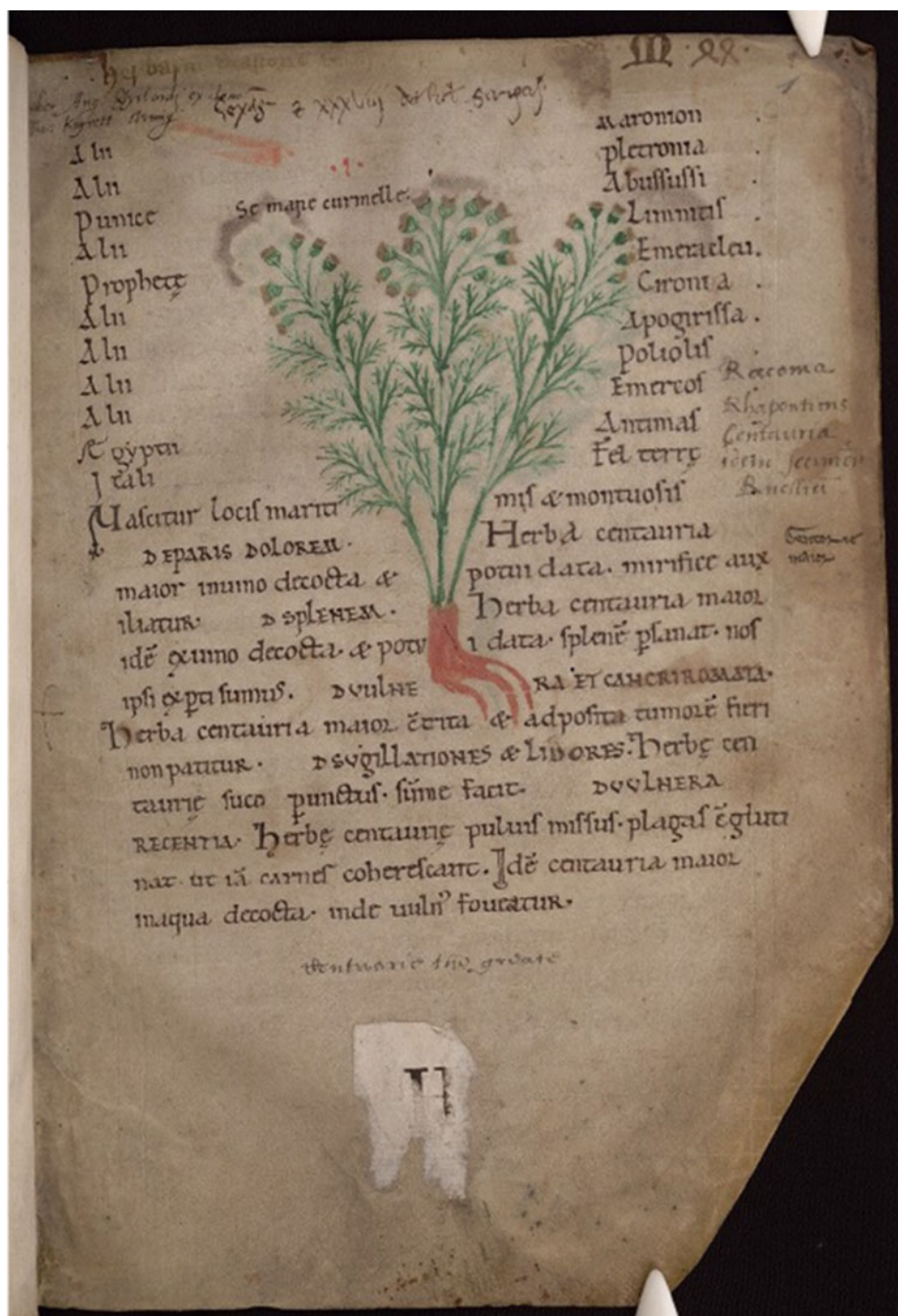
**Table 1.** Weeds mentioned in multiple published sources from the period 1523 to 1788.

Common name	Scientific name	Fitzherbert 1523	Markham 1614	Ellis 1741	Hale 1758	Complete Farmer 1766	Marshall 1788
Thistle	Asteraceae spp.	•		•	•		
Common sow thistle	<i>Sonchus oleraceus</i> L.					•	•
Spear thistle	<i>Cirsium vulgare</i> (Savi) Ten.				•		•
Musk thistle	<i>Carduus nutans</i> L.					•	•
Way-thistle	<i>Cirsium arvense</i> (L.) Scop.					•	•
Charlock/wild mustard	<i>Mustarda arvensis</i> (L.) D.A. German	•		•	•	•	•
Dock	<i>Rumex</i> spp.	•					
Bloody dock	<i>Rumex sanguineus</i> L.			•			•
Sheep's sorrel	<i>Rumex acetosella</i> L.			•		•	•
Broad-leaved dock	<i>Rumex obtusifolius</i> L.					•	•
Common sorrel	<i>Rumex acetosa</i> L.					•	•
Corn cockle	<i>Agrostemma githago</i> L.	•		•	•	•	•
Darnel	<i>Lolium temulentum</i> L.	•	•	•		•	•
Corn marigold	<i>Glebionis segetum</i> (L.) Fourr.	•		•	•	•	•
Mayweed	<i>Anthemis cotula</i> L.	•		•	•	•	•
Poppy	<i>Papaver</i> spp.			•	•		
Corn poppy	<i>Papaver rhoeas</i> L.					•	•
Ferns	<i>Pteridium</i> spp.			•	•	•	•
Wild oat	<i>Avena fatua</i> L.	•		•	•		
Cornflower	<i>Centaurea cyanus</i> L.	•				•	•
Great knapweed	<i>Centaurea scabiosa</i> L.					•	•
Crow garlic	<i>Allium vineale</i> L.			•	•	•	
Melilot	<i>Melilotus</i> spp.			•	•		
Common melilot	<i>Melilotus officinalis</i> (L.) Lam.					•	
Hogweed	<i>Heracleum</i> spp.			•			
Hogweed/cow parsnip	<i>Heracleum sphondylium</i> L.					•	•
Spiny retharrow	<i>Ononis spinosa</i> L.			•			•
Common retharrow	<i>Ononis spinosa</i> subsp. <i>procurrens</i> (Wallr.) Briq.					•	•
Colt's foot	<i>Tussilago farfara</i> L.			•		•	•
Couch grass	<i>Elymus repens</i> (L.) Gould			•	•	•	•
Bindweed	<i>Fallopia convolvulus</i> (L.) Á. Löve			•		•	•
Shepherd's needle	<i>Scandix pecten-veneris</i> L.			•		•	•
Cleavers	<i>Galium aparine</i> L.			•		•	•
Ivy-leaved speedwell/small henbit	<i>Veronica hederifolia</i> L.					•	•
Bastard alkanet	<i>Lithospermum arvense</i> L.					•	•
Pimpernel	<i>Anagallis arvensis</i> L.					•	•
Common chickweed	<i>Stellaria media</i> (L.) Vill.					•	•
Knotgrass	<i>Polygonum aviculare</i> L.		•			•	•
Sun-spurge	<i>Euphorbia helioscopia</i> L.					•	•
Field buttercup	<i>Ranunculus arvensis</i> L.					•	•
Creeping buttercup	<i>Ranunculus repens</i> L.					•	•
Upright meadow buttercup	<i>Ranunculus acris</i> L.					•	•
Hemp-nettle	<i>Galeopsis tetrahit</i> L.					•	•
Fumitory	<i>Fumaria officinalis</i> L.					•	•
Heartsease	<i>Viola tricolor</i> L.					•	•
Wild carrot	<i>Daucus carota</i> L.					•	•
Field bindweed	<i>Convolvulus arvensis</i> L.					•	•
Bladder campion	<i>Silene vulgaris</i> (Moench) Garcke					•	•
Dewberry bush	<i>Rubus caesius</i> L.					•	•
Wild mint	<i>Mentha arvensis</i> L.					•	•
Self-heal	<i>Prunella vulgaris</i> L.					•	•
Common yellow toadflax	<i>Linaria vulgaris</i> Mill.					•	•
Ox-eye daisy	<i>Leucanthemum vulgare</i> Lam.					•	•
Common yarrow	<i>Achillea millefolium</i> L.					•	•
Common nettle	<i>Urtica dioica</i> L.					•	•
Red eyebright	<i>Odontites vulgaris</i> Moench					•	•

This text defines a weed as “any plant growing in a field different from what the farmer intended” before detailing the ecological reasons weeds are so destructive; explaining annual, biennial, and perennial life cycles in weedy species; outlining methods for destroying weeds; listing common British weeds by where they are found (arable land vs. pasture) and when they are likely to be troublesome; and describing the physical appearance of each of the species mentioned. A slightly later attempt to comprehensively list

specific species as a coherent group of “weeds” comes from 1788, when a Mr. William Marshall provided a written list of “Weeds and Vermin” in his account of the rural economy of Yorkshire. He focused on methods for the destruction of these plants rather than describing their morphology in great detail but generally offered enough information that someone familiar with weeds in arable fields would be able to determine which plants he is referencing.





**Figure 1.** Illustration of “curmelle,” an unidentified species of *Centaurea*. Fol.1r from Oxford MS Bodley 130.

### Herbals and Botanical Illustration: Early Medieval to Early Modern

While not explicitly agricultural in nature, illustrated herbals represent a long tradition of scientific writing in premodern Europe broadly and England specifically. Herbals are medical treatises filled with plant-based remedies for various ailments and date back to European antiquity as a genre of medical and botanical writing. In England, manuscripts of herbals containing identifiable botanical illustrations date back to the early medieval period. The earliest illustrated herbal from England, the

9th-century Cotton MS Vitellius C. iii held by the British Library, contains the text of the *Old English Herbarium*, which is a collection of Old English translations of various herbal medical treatments that originated with Latin authors (Van Arsdall 2023). Later illustrated herbals in Latin with Old English glosses and commentaries from medieval Britain include Bodley 130 and Ashmole 1431, both produced in the late 11th century and held by the Bodleian Library at Oxford (Collins 2000). Figure 1 reproduces an illustration of an unidentified knapweed species (*Centaurea* spp.) similar to the cornflower described in the 16th century by Fitzherbert (1523). The introduction of printing and

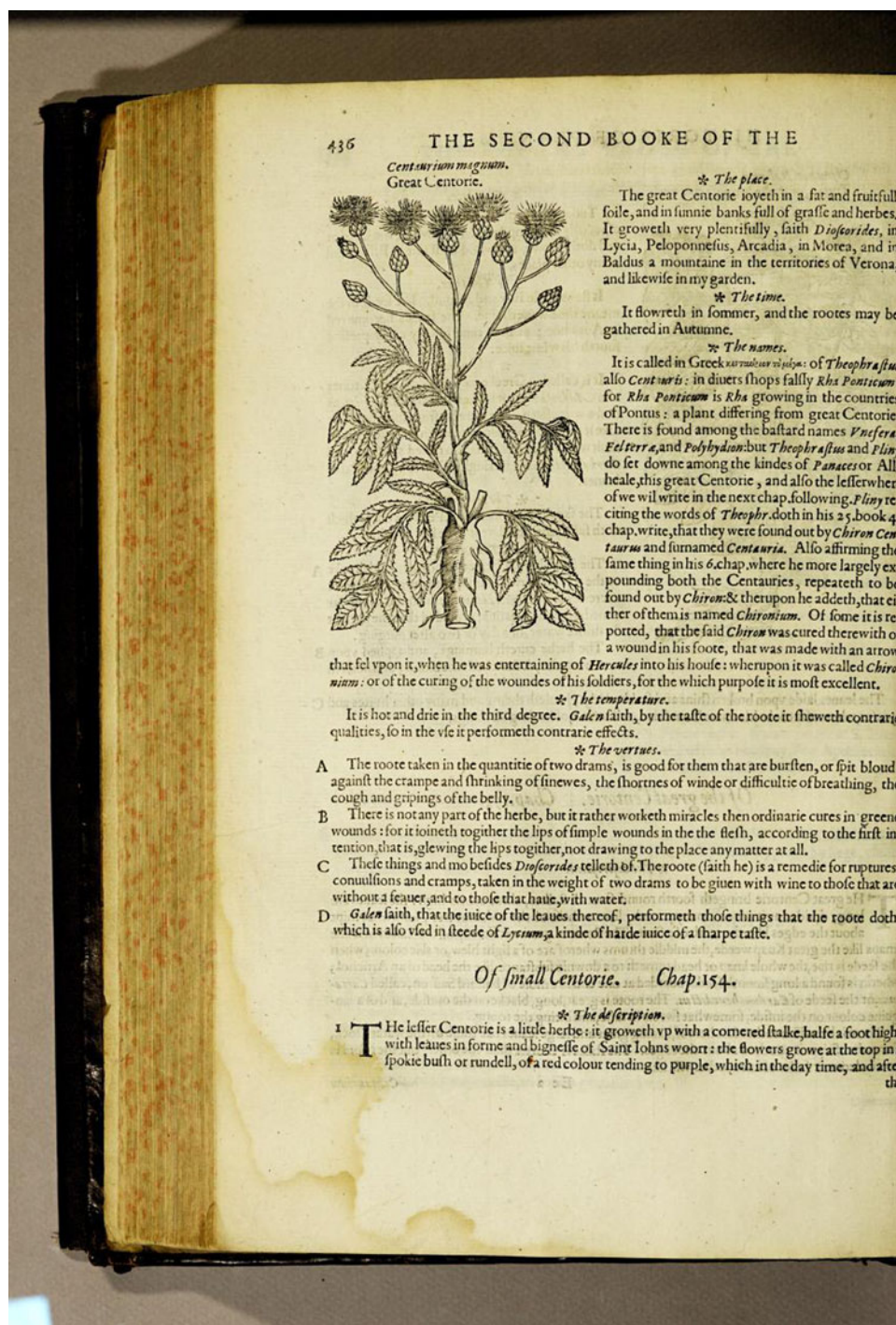


Figure 2. Illustration of “great Centorie” or “*Centaurium magnum*,” likely greater knapweed (*Centaurea scabiosa* L.), from Gerard’s Herball (1597).

in particular the use of woodblock printing for images to Europe in the 15th and 16th centuries created an explosion of illustrated herbals, particularly in the Netherlands and eventually in England as well (Chen 2020; Moran 2017; Rosenberg 2023). Figure 2 reproduces an illustration from an entry in John Gerard’s (1597) herbal that likely refers to greater knapweed (*Centaurea scabiosa* L.).

Two important elements of these medical writings implicate them in the development of weed identification manuals. The first and most obvious connection is the use of early botanical

illustration of specific and identifiable plant species, a form of scientific illustration that became both more technical over the course of centuries and more common with the advent of printed illustration in the early modern period. The second element of these texts is the description of the habitats of the plants included within the herbals. As far back as the *Old English Herbarium*, plants are identified by the locations in which they grow, such as fields, meadows, ditches, or other specific places in the landscape (see, e.g., the description of lady’s mantle [*Alchemilla vulgaris* L.] in Van Arsdall 2023).





**Figure 3.** Illustration of cornflower (*Centaurea cyanus* L.) from Martyn (1794).

These two elements develop together in particular during the early modern period. Gerard's (1597) early printed herbal frequently describes plants such as corn marigold as growing "among corne" and contains a printed illustration of the plants in question. A later herbal by Elizabeth Blackwell (1737–1739) similarly describes and identifies plants that are found in fields or "among Corn," such as restharrow (*Ononis spinosa* L.), and provides detailed illustrations of these plants. Unlike in the agricultural treatises, these plants are not explicitly identified as

weeds, and the word "weed" appears only in the names of plants, for example, mayweed (*Anthemis cotula* L.) named in both Gerard (1597) and Blackwell (1737) as *Cotula foetida*.

### Weed Identification Manuals: 1792 to the Present

What might be termed the first true weed identification manual or textbook appeared in the early 1790s, bringing together these various threads touching on noncultivated plants in agricultural

contexts. Thomas Martyn, a lecturer in botany at the University of Cambridge, published in four volumes the *Flora rustica: Exhibiting Accurate Figures of Such Plants as Are Either Useful or Injurious in Husbandry*, the first volume of which was published in 1792 and the last in 1794. This text, which includes detailed botanical illustrations of each plant alongside scientific descriptions and observations of the plants, combines harmful flora with cultivated and beneficial plants in a manner duplicated more than half a century later in the United States by William Darlington (1847; Byrd et al. 2023). Figure 3 reproduces the illustration of cornflower from volume 4 of Martyn's (1792–1794) treatise. The plant itself is identified as a common weed in the accompanying text. This is not to say that Darlington was inspired by Martyn; there is no evidence that he was aware of the *Flora rustica*, which was never completed and had only a limited print run in the 1790s (Gorham 1830, 197). Darlington was, however, a prolific collector of botanical texts, including works by British writers, such as Smith's *English Botany* (volume 1 of which is attributed to James Sowerby [1790], who created the illustrations, but the text is by Smith [Gorham 1830]), Loudon's 1829 *Encyclopedia of Plants*, and Hooker's 1830 *British Flora* (Darlington 1826, 1829, 1832).

Cross-pollination between England and American agricultural writing can be traced back to at least the late 18th century, documented through correspondence from the time of the Revolutionary War onward in letters from James Warren to John Adams requesting the purchase of a copy of Arthur Young's treatise *Rural Economy* (Loehr 1937). Sir John Sinclair, the Scottish agriculturalist, corresponded with George Washington on the subject of agricultural improvement and the potential creation of an American Board of Agriculture from the early 1790s onward (Sinclair 1831). Arthur Young similarly corresponded with Washington on agricultural improvement throughout the late 1780s and the 1790s, with Washington raising general concerns about weeds in several letters (Washington 1803, 11, 16, 102). Concerns about specific weeds appear in American agricultural writing dating back to at least 1782, in the text *Letters from an American Farmer*, where the fictional narrator, "James," expresses particular concerns about wild cucumber [*Echinocystis lobata* (Michx.) Torr. & A. Gray] alongside hogweed (*Heracleum* spp.) and other species (St. John de Crèvecoeur and Stone 1981, 365).

Later 19th-century publications were not as ambitious as Martyn. William Pitt's treatise on weeds, for example, took the form of a letter to the British Board of Agriculture and was printed in a collected volume in 1806. A later essay by Benjamin Holdich (1826, 1) criticized Pitt's letter, claiming that Pitt "knew little of agriculture" and that his letter had many omissions and lacked "any practical arrangement." Holdich furthermore claims to be the first to publish such an essay on weeds and their destruction. While this is patently untrue, the short length of Holdich's essay in comparison to earlier, more exhaustive texts provided a model for later weed identification manuals across North America in particular. These manuals, often focused on specific regions, such as individual states or provinces in the United States and Canada, were frequently short bulletins or essays that offered practical advice for farmers on identifying and destroying weeds in their fields (e.g., Anonymous 1894; Hillman 1893). Other texts resembled Martyn (1792–1794) or Darlington (1847) in their format but focused entirely on weeds (e.g., Michener 1872). A further extension of this genre, usually authored by women, contained illustrations and descriptions of these plants and identified them as weeds while being classified as botany rather

than weed science, such as Jane Loudon's illustrated manuscript on British wildflowers from 1846 or Anne Pratt's manual on noxious plants in the British landscape from 1866.

In the late 19th and early 20th centuries, weed identification manuals became more targeted for distribution to farmers, appearing in the form of pamphlets or short bulletins (e.g., Anonymous 1894). Some examples continued to produce colored plates to illustrate the species (e.g., Clark and Fletcher 1906), while others included early examples of botanical photography to aid with identification (e.g., Hillman 1893). Since the late 19th century, weed identification manuals have proliferated to the point that it would be impossible to review all the manuals for North America. As these texts have proliferated, they have become more and more specialized. There are manuals focused on weed seeds (Delorit 1970; Martin and Barkley 1961), manuals focused on annual or perennial weeds (Anderson 1999; Cuthbertson and Hall 1997), manuals for weeds in certain cropping systems or habitats (Bonanno and Everts 2007; McCarty 2008), manuals for specific states or regions (Beal 1915; Neal et al. 2023) — the list continues. In the 21st century, weed identification tools have moved into the digital realm with websites like WeedImages.org and apps like ID Weeds (University of Missouri Extension, n.d.). The important characteristics of these manuals (and digital identification tools) are that they contain detailed descriptions and/or illustrations of the species in question, they often describe the habitats of said species, and they identify these plants as weeds. These characteristics did not emerge out of nowhere in the 19th century but have a long history rooted in premodern English writing on botany and agriculture.

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