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### **How are weeds named: A committee review of the WSSA composite list of names**

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**Short title:** Weed names

## Abstract

Plant names carry a significant amount of information without providing a lengthy description. This is an efficient shorthand for scientists and stakeholders to communicate about a plant, but only when the name is based on a common understanding. It is standard to think of each plant having just two names, a common name and a scientific name, yet both names can be a source of confusion. There are often many common names that refer to the same plant, or a single common name that refers to multiple different species, and some plants are without a common name at all. Scientific names are based upon international standards; however, when there is not agreement in the taxonomy, two scientific names may be used to describe the same species. Weed scientists and practitioners can easily memorize multiple plant names and know that they refer to the same species, but when we consider global communication and far-reaching databases, it becomes very relevant to consider two sides of this shift: 1) A need for greater standardization (due to database management and risk of lost data from dropped cross-referencing) *and* 2) the loss of local heritage which provides useful meaning through various common names. In addition, weed scientists can be resistant to changing names that they learned or frequently use. The developments in online databases and reclassification of plant taxonomy by phylogenetic relationships have changed the accessibility and role of the list of standardized plant names compiled by the Weed Science Society of America (WSSA). As part of an attempt to reconcile WSSA and USDA common names for weedy plants, the WSSA Standardized Plant Names Committee recently concluded an extensive review of the Composite List of Weeds common names and had small changes approved to about 10% of the list of over 2800 distinct species.

**Keywords:** communication, conservation, nomenclature, plant databases, plant names, standardization, weediness

## **Introduction**

Words matter, especially in science. Successful communication requires that the speaker and listener have the same understanding of connotation when language is used (Knapp et al. 2007). This is important particularly when referring to plant names in the weed sciences to avoid confusion about plant identification and communicating best management and treatment methods. Plants are conventionally described with the use of a common plant name and a scientific name. Frequently, common plant names are used to facilitate communication between and among scientific and non-scientific audiences. However, these common names lack standardization by their very nature of being reflective of regional and cultural influences. This lack of standardization has been a source of confusion in national education and awareness efforts. With a mission to: “promote research, education, and extension outreach activities related to weeds; provide science-based information to the public and policy makers, and foster awareness of weeds and their impacts on managed and natural ecosystems”, the Weed Science Society of America (WSSA) is poised to provide guidance to facilitate a common communication framework regarding weed nomenclature.

### ***Plant common names***

Plant common names are used when referring to plants colloquially, in contrast to the standardized and accepted naming conventions of scientific names. These names are usually in the regional vernacular and, therefore, are easier for the general public to remember. Memorability can also make it easier for various stakeholder groups to understand which species is being referenced in non-technical communication. Common names are often regionally based, with cultural and historical ties to the plant’s use. Weed scientists, due to the applied nature of their work, often find the need to communicate with the public. Therefore, both standardized scientific names and common names may be used in a specific geography depending on the type of communication and its intended audience.

### ***History of WSSA Composite List of Weeds***

The Weed Society of America (WSA) was officially formed in 1956 but the WSA journal *Weeds* had been published since 1951. A need for standardized terms and language for communication between all members and journal subscribers was tasked to the WSA Terminology Committee with these objectives: a) to develop, standardize, and coordinate the terminology in the field of weed control and the selection of common names for herbicides, b) to

review, revise, and develop standardized terms, abbreviations and definitions used in the field of weed control (Terminology Committee Report 1956). The committee was responsible for maintaining a list of herbicides, adjuvants, and accepted abbreviations. Since 1960, the WSA and subsequently the WSSA has maintained a list of standard nomenclature for weedy plants, including common and scientific names, referred to as the Composite List of Weeds (CLW) (Report of the Terminology Committee, 1960). Weeds mentioned in the journal were primarily referenced by common name throughout the early years. Therefore, the CLW began as practical approach that fulfilled a specific role: weed scientists from all over the United States would communicate using an agreed upon terminology. As an inevitable consequence, however, the weed common names included in the CLW began to permeate through various extension work and training of farmers and university students.

Beginning with the narrow purpose of the list as a reference for WSSA members and those who subscribed to the journal, names were added or changed as part of a comprehensive review and publication of the new list in the physical journal. The updates and changes are recorded in each iteration of the list. For instance, *Sorghum halepense* (L.) Pers is referred to as Johnson grass before the initiation of the list (Oyer et al. 1959), Johnsongrass in 1960 (Report of the Terminology Committee, 1960), and finally johnsongrass in 1966 (Report of the Terminology Committee, 1966). Many woody plants and aquatic plants were added in the 1966 list, with a special designation for each of three categories. However, by 1984 the list was all consolidated and no designations were made (Report 1984); this is how the online searchable database has remained. Only additions and minor changes were appended in 1988, and the consolidated list published in 1989 was referenced as the standard for publications and communication until the updated list in 2010. The WSSA CLW has been available online since the first website iteration in 2000, supporting the mission to increase awareness and provide information on weedy plant species. The CLW was last updated in 2017, at which time it included entries for 3,756 plants, including 2,847 unique species and 909 synonymic names (WSSA 2023).

### ***Multiple sources for naming information***

Of course, in these days of online databases, the CLW is not the only source for plant naming information available online and many members of the society may use additional databases. The International Plant Names Index (IPNI), World Flora Online (WFO), Plants of the World Online (POWO), Flora of North America, Tropicos: all are trusted websites with a large database of plant names and most of these websites even reference to each other (<https://www.ipni.org>; <https://www.worldfloraonline.org>; <https://powo.science.kew.org>; <http://floranorthamerica.org>; <https://www.tropicos.org> ). The USDA NRCS PLANTS database (United States Department of Agriculture, Natural Resources Conservation Service, Plant List of Attributes, Names, Taxonomy, and Symbols; hereafter referred to as PLANTS; <https://plants.usda.gov/>) is a leading source of standardized taxonomic floristic information for U.S. federal agencies, universities, and the public and is the taxonomic authority for the official journal publications of the WSSA (Weed Science, Weed Technology, and Invasive Plant Science and Management) as indicated in instructions for authors (<https://www.cambridge.org/core/journals/weed-science/information/instructions-for-authors>). The PLANTS database provides basic information and imagery (e.g., scientific names, common names, characteristics, distribution, images, invasive/noxious status, rarity status, wetland status) for over 38,000 vascular plants, mosses, liverworts, hornworts, and lichens growing outside of cultivation across the PLANTS Floristic Area (PFA), which includes the U.S., its territories, and protectorates, Canada, Greenland, and Saint Pierre and Miquelon, and is one of the most widely accessed US government website with over 1 million views noted annually worldwide.

For the WSSA, as a scientific society based in North America and largely considered to be a subdiscipline of agronomy, the USDA PLANTS database has been a sound reference. However, the increasing internationalization of the scientific journals published by the WSSA may indicate the need to reconsider which reference to utilize for accepted scientific names. The goal of the PLANTS database is to be consistent with the Flora of North America (FNA) (for the continental U.S. and Canada) and the database team is actively working on updating the recent volumes published in the FNA. The FNA started out using the Cronquist classification system but then switched to the Angiosperm Phylogeny (APG) IV system.

Although the scientific name was not the subject of this review, plans are underway to update the scientific names. As the terminology committee turns to update the scientific names for the CLW, implications for scientific journals with an international scope, such as *Weed Science*, need to be considered. The IPNI is a collaborative effort between US, UK, and Australian herbariums providing a nomenclatural database but does not include any common English names (<https://www.ipni.org>). Tropicos is also a nomenclatural database maintained by the Missouri Botanic garden for a world wide list of scientific plant names with the option to search by classification system. Kew gardens is a contributor to IPNI and also hosts its own database ‘Plants of the World Online’ with sources for names, distribution maps, references, and an opinion of the accepted scientific name (<https://powo.science.kew.org>). The IPNI provides extensive nomenclatural data without designating a single accepted name; however, it does link to both World Flora Online and Plants of the World Online pages- each of which have more detailed information and a clear opinion of the current accepted taxonomy according to referenced data (<https://www.ipni.org>; <https://www.worldfloraonline.org>; <https://powo.science.kew.org>) although it appears Plants of the World online is a more complete reference.

The committee will be re-evaluating which classification system it will recommend WSSA should follow for scientific names, but the remainder of this paper will focus on the use of common names, the role of CLW, and collaboration with PLANTS.

### ***Limitations to Standardized Lists***

There can be benefits to standardizing plant common names for communication purposes within and between stakeholder groups, especially for large public awareness efforts to control an invasive species or limit the spread of a noxious weed. Even in concerted national efforts like this, most of those involved would not be plant specialists and would not respond to an accurate, but cumbersome, scientific name. However, there is often pushback to change a name that is already accepted in groups and discrepancies are maintained due to the frequency of use of a particular name within a given community. In these cases, changing a plant’s common name to create a standard between user groups may improve communication between those groups but could be a detriment to communication within the group that is adopting a new name. Although, changing the accepted standard name in WSSA’s official communications is unlikely to prompt

an change by stakeholders immediately, if at all. This tension between descriptive (i.e., reflects common usage among an audience) and prescriptive (i.e., reflects other communication goals of, e.g., WSSA as a professional society) decisions about standardizing common names was an important consideration for the committee while conducting the review.

Common names are by their very nature diverse and variable between communities, geographic regions, and cultures. A single species may have numerous common names if it is ubiquitous and culturally relevant, as is the case of *Hypericum perforatum* L., which is referred to as common St. Johnswort, but has been documented as having over 80 common names (Dauncey et al. 2019). Or several different species may go by the same common name. For example, there are many different species in the genus *Solidago* L. that share the common name “goldenrod”. In contrast, some plant species may not have a common name at all, as is the case for many mosses/Bryophytes, because the species are not culturally relevant and scientific names are sufficient for communication among interested parties.

In recent years, the WSSA journals have moved to Cambridge Core University Press and the PLANTS database has been the reference for the scientific names of weeds. A comprehensive review was initiated by the WSSA Board via a suggestion to the WSSA P23 Committee on Standardized Plant Nomenclature (formerly P22b, a subcommittee of the Terminology Committee). Unlike previous updates to the CLW which primarily made small updates and added new names, this review was a complete list comparison that would evaluate where PLANTS and CLW common names diverged and by how much. The ultimate objective of the review was to provide recommendations for an updated, revised list of WSSA-sanctioned common names to the WSSA Board for review. The committee was also tasked to work in cooperation with representatives from the Plant Data Team (<https://plants.sc.egov.usda.gov/home/team>) to reconcile common names in the CLW with the PLANTS database where possible.

## **Review Approach**

### ***Compiling the weed lists***

The CLW and PLANTS lists were both downloaded in 2020 when the review began. The lists were organized by scientific name and merged in order to compare the common names in 2020. Information for plant species represented in the PLANTS database that were not represented in the CLW were removed as part of process of merging the two lists.

### ***Finding discrepancies***

A preliminary evaluation of the merged list of plant species was conducted to identify cases where common names were the same in both databases and cases where common names needed to be reviewed. The merged list of plant names comprised a total of 5,423 lines of data, not all of which represented unique species due to discrepancies between the databases that created duplicates when merged. During this preliminary evaluation status was determined as follows:

1. Common names were the same (1,078 cases),
2. Common names were orthographically different (e.g., slight differences in spelling, hyphenation, spacing, capitalization, diacritical marks) (219 cases),
3. Common names were completely different (1,744 cases),
4. Common names were flagged as different because PLANTS gives “.”(no value) as common name (1,178 cases),
5. Flagged as different because PLANTS gave “NA” as common name (128 cases),
6. Flagged as different because CLW gave “see [species taxonomic synonym]” (1,076 cases).

No action was initially needed for status 1 and 6. These were initially omitted from the review, leaving 3,270 cases (status 2, 3, 4, and 5) that were reviewed by the committee. This preliminary evaluation did lead the committee to conclude that an initial objective of complete reconciliation of common names from the two sources would not be feasible due to the large number of cases of complete divergence.

### ***Creating guidelines for decisions on names***

In March 2021, the committee began to develop guidelines for determining how names in the CLW could be written more consistently (punctuation, compound words, endings, capitalizations) and less discriminatory (e.g., derogatory slang, imperialist possessive language), and to change a name in the CLW to to match the PLANTS. The committee initially agreed that reconciling the common names in CLW and PLANTS as much as possible would be a goal, but



in cases where a plant was a very widespread, common, or troublesome weed that the CLW name should be conserved in the interest of facilitating communication about those plants as weeds. By September, 2021 the following list of guidelines was agreed upon by the committee and WSSA board:

1. Botanically incorrect or inappropriate names will be changed (i.e. spring whitlowgrass-> spring whitlow since it is not a grass)
2. Punctuation will be removed with the following conditions:
  - a. Hyphens will be removed and the word will become compound or separate in accordance with similar words in PLANTS database
  - b. Possessive ’s will drop entirely in case of proper nouns: following the example of Palmer amaranth (not Palmer’s amaranth, Nuttall x rather than Nuttall’s x)
  - c. The apostrophe will drop and the “s” remain in cases of common nouns following the example of shepherds purse
3. Compound words will be evaluated and may be separated based on the following conditions:
  - a. Words will not be separated when the compound word refers to a distinct group of plants
    1. E.g. sowthistle, goldenrod, ragweed, honeysuckle, burdock, chickweed, milkweed, morningglory, etc.
    2. Usually this is in agreement with PLANTS, but sometimes not, see 3.c.
  - b. Words will not be separated when the compound word is a commonly used combination of a descriptor and plant part
    1. E.g. broadleaf, cutleaf, dayflower, ect.
    2. Refer to the PLANTS database for other examples of the word in question to determine commonality
  - c. Words will not be separated when the PLANTS conflict contains a hyphen

1. E.g. PLANTS uses swallow-wort, star-thistle, but CLW uses swallowwort, starthistle. Words of this type should stay together as CLW already has them
  2. In some cases, the opposite may be true. CLW name may contain two words and the PLANTS has a hyphen. In this instance, the CLW name may stay separate.
4. Complete name departures from the PLANTS list will be conserved to CLW (Palmer amaranth, yellow indigo) unless
- a. The CLW name is inappropriate, culturally insensitive, etc. (Eastern Jew mallow)  
See rule 1.
  - b. The CLW name is not specific to specific epithet, for instance when the WSSA common name refers to a group of plants or could apply to several species (many species are a type of “yellow rocket”, PLANTS differentiates between them while WSSA refers only to *Barbarea vulgaris* as ‘yellow rocket’). In these cases, an adjective may be added
  - c. The name is not a very common weed in WSSA communication and literature and there is a very good justification for the plant to be referred to by PLANTS name instead
5. Names that differ from PLANTS only in capitalization or word endings will be conserved to PLANTS unless
- a. Weed is common in WSSA communication and literature (i.e. johnsongrass, fall panicum)

### ***Review***

The list of 3720 cases with status 2, 3, 4, or 5 were evenly split among four teams of two members within the committee (Fig. 1). Each team carefully reviewed 100 to 200 cases per month and then brought any suggested changes or cases that required deliberation to the whole committee. After all cases of disagreement between the two databases were completed, the committee decided that there was a need to evaluate the cases that initially matched (status 1)

but might be inconsistent with the new naming guidelines for the CLW that were developed during the review. After all common names were reviewed, suggested changes were compiled and again reviewed by each member of the committee who individually voted to approve or reject each change (Fig. 1).

### ***Finalized list***

Once all suggested changes were compiled and approved by a majority of committee members, the list of changes was sent to the WSSA board, who discussed and approved the changes on January 31, 2023. The final list can be found (<https://wssa.net/weed/composite-list-of-weeds/>), although we do not expect this to be a permanent, definitive list. Some names that were debated and ultimately not changed, may be changed in the future, while others that were not considered may be the subject of future discussion.

### **Resulting list**

#### ***Conflicts between CLW and PLANTS common names***

One clear result from this effort to reconcile common names is the extent of disparity between the names used by these two organizations, WSSA and USDA. At the onset of the review, a quick search of the most common and problematic weeds in the PLANTS database led to much discussion among the members due to the differences in common names of some species that are ubiquitous in weed science. For example, *Amaranthus palmeri* is listed as ‘carelessweed’ in the PLANTS database instead of the well-cited ‘Palmer amaranth’ in weed science literature. Review of the whole WSSA list revealed 2,254 names inconsistent with the PLANTS database (Fig. 2). When reviewing such a large number of plants it was difficult for the committee to decide whether changing any particular common name would benefit our overall goal of facilitating communication.

One important function of the CLW is in promoting a shared terminology when training future weed scientists and practitioners. Weed science courses, extension programming, and other training opportunities held throughout the US have used and will continue to use the CLW as the reference for names of weedy plant species. Species lists included in weed identification events at weed contests held each summer represent a level of consensus within the regional weed science societies that certain species should be identifiable by trainees, and thus the committee considered this a good basis for the species of greatest concern. The committee compiled weed contest species lists that were available, to establish name guidelines. After

compiling lists from 14 weed contests held in the Southern and Northeast regions or nationally between 2005 to 2019, 351 unique common names were found, but only 272 unique plants, most of which were still in conflict with the PLANTS names (Fig. 2).

### ***Inconsistencies in names within the list***

Inconsistencies in orthography (i.e., spelling, spacing, punctuation, and capitalization) between common names with similar lexical construction (i.e., linguistic meaning) were not standardized across the CLW. Some differences in common names between the PLANTS and CLW databases were often solely orthographical, but the PLANTS had no better consistency in naming conventions. In the current digital landscape, orthography matters when conducting text searches. Many plant common names are compound words with many possible orthographical variants. For example, mouse ear chick weed, mouseear chickweed, and mouse-ear chick-weed could all be considered reasonable variants of the common name of *Cerastium fontanum* Baumg. ssp. *vulgare* (Hartm.) Greuter & Burdet. Even before internet text searches, the first list published by the WSSA terminology committee noted that “*Hyphenated and possessive names have largely been eliminated. Preference is given to unified or linked names such as eveningprimrose, morningglory, pepperweed, and canarygrass for groups of species with a basic common name,*” (Report of the Terminology Committee, 1960). Efforts of this review have more closely aligned with this sentiment in the current list revision.

Many plants are named after places and people, which are proper nouns that would be capitalized conventionally in English grammar. However, there are examples of names which share this origin and have lost their capitalization over time like jimsonweed, johnsongrass, or refer to a common noun which could be mistaken for a proper noun e.g., turkey. This change was made consistent in the CLW published by WSSA in 1966, “*Combined names involving a proper name such as bermudagrass, christmasberry, and joepyeweed are not capitalized. Proper names derived from persons or places are capitalized when used separately in the common names such as Kentucky bluegrass, Jim Hill mustard and Howell manzanita,*” (Report of the Terminology Committee, 1966). This was the first time that johnsongrass, formerly Johnsongrass, was listed in lowercase according to the combined name logic. It is possible that after the list was standardized according to this logic in 1966 that eventually other names were added without undergoing the change. In this review, we maintained that if the former proper noun was compounded, the name was not capitalized.

It was also discussed if qualifiers such as ‘common’, ‘grass’, and ‘weed’ were necessary to be included. In names of ubiquitous species such as ‘common lambsquarters’ (*Chenopodium album* L.), it first seems unnecessarily cumbersome, yet knowing that many other *Chenopodium* species have common names that include ‘lambsquarters’ besides *C. album*, the committee felt it was necessary to keep ‘common’ as a qualifier for many species (Table 1). In evaluating names with ‘grass’ and ‘weed’, it was even more clear that such names must be kept until another name should present itself. For example, ragweed, pepperweed, Texas weed and Mexican weed could not very well be shortened without an entirely new name. Therefore, it was decided that such plants should have a consistent placement throughout the list by space, hyphen, or connected to the previous word in the compound.

### ***Justification of changes***

Of the entire CLW common names (2,847 unique species) it was decided that most species would retain their common name despite a conflict with the PLANTS database name (Fig. 3). The committee ultimately recommended changes to common names of 371 species, with changes ranging from minor spelling corrections to complete adoption of the PLANTS name. Suggested changes were generally intended to accomplish one of three goals: 1) to remove inaccurate or insensitive names, 2) to simplify and standardize orthography, or 3) to match the PLANTS database name when doing so would not be expected to cause confusion or conflict in the weed science community. Specific reasons were cited for each suggested change and are summarized below (Table 2). Of the 2,471 species without any suggested change, there were 207 species which had a taxonomic discrepancy which will need to be looked at more closely in the next review and were not considered for common name changes at this time. The list was reviewed and approved by 7 of the 8 committee members with 1 abstention.

### **Implications and Next Steps**

#### ***The stories behind names***

Common, standard, or scientific names of plants are rarely determined arbitrarily and most have a history, real or imagined, that assists in remembering the plant. Usually, the source of a naming conflict faced by scientists lies between differentiation and standardization. The rich variety and meaning of localized names can be lost in standardization. Some common names are related to the plant’s cultural role, use, or adverse effects, as is often the case with cultivated and weedy plants (e.g., any plant with “weed” in its common name). Many common names are

descriptive in nature, referring to distinct morphological characteristics that aid in identification of the species [e.g., velvetleaf (*Abutilon theophrasti* Medik.) and shepherds purse (*Capsella bursa-pastoris* (L.) Medik.)]. Others refer to a plant's ecological role [e.g., butterfly milkweed (*Asclepias tuberosa* L.)], native geographical range [e.g., Eurasian watermilfoil (*Myriophyllum spicatum* L.)], place of cultural origin [e.g., jimsonweed (*Datura stramonium* L.)], or to important figures at the time the name was adopted [e.g., Palmer amaranth (*Amaranthus palmeri* S. Watson)]. Common names reflect the sentiment of the communities that adopt them, but also shape and are shaped by the dialogue about the species they refer to as their usage spreads beyond the locations where the names originally arose.

Memorializations in plant names can be found in a vast number of species. These memorializations can occur from Greek mythology, farmers, or scientists. For example, Palmer amaranth was named after Edward Palmer (1829-1911), a British botanist and early American archaeologist in 1877 (Safford 1911). He is known as the 'Father of Ethnobotany' and gathered extensive natural history collections in North and South America during the late 19<sup>th</sup> century (Vasey and Rose 1890). Over 200 species are named after him. As another example, Colonel William Johnson, a farmer in Marion Junction, Alabama, established his namesake, johnsongrass (*Sorghum halepense* (L.) Pers.), along the Alabama River in the 1840s as a forage species (Ball 1902). Johnsongrass was likely introduced to the US prior to this time, but searching for documentation has been hampered due to the use of more than 40 common names and eight scientific names for this weed during the 19<sup>th</sup> century (Snowden 1936). It is likely that broad use of the common name johnsongrass in the United States resulted from a 1874 letter from Herbert Post of Selma, Alabama to USDA employee George Vasey (McWhorter 1971). By 1896, the USDA deemed johnsongrass a 'severe weed' and initiated research to control johnsongrass in 1900 (Coville 1896; Galloway 1901).

Memorializations in names have a long tradition in science and can open a conversation about history in our classrooms and fields, but it is also worth noting that the history is very biased to celebrate a certain demographic of people. The American Ornithological Society recently decided to remove such memorializations and began an effort of renaming many birds to be more descriptive (Council of the American Ornithological Society 2023). Our society may also consider such revision in the future, but no such changes were made to the current list.

### ***High profile plants to illustrate the difficult decisions faced by the committee***

Especially for weeds which are particularly common or difficult to control, and thus are widely studied and referenced within the WSSA, the occurrence of multiple common names for a single species can be a hindrance to compiling research results for meta-analyses, writing informative herbicide labels, and advocating for public support and federal funding. We highlight here just four plant species that represent some of the difficulty the committee had in reviewing the entire list of names.

#### Palmer amaranth (*Amaranthus palmeri* S. Watson)

Over the past 30 years, *Amaranthus palmeri* has become one of the most well-known agricultural weeds in the United States (Ward et al. 2013). It is an annual warm season (C4) dioecous (separate male and female plants) forb native to the arid southwest United States including southern California, New Mexico and Texas, and northwest Mexico (Sauer 1957). In its native range, *A. palmeri* is considered a culturally important plant species by indigenous populations including the Cocopa, Navajo, Pima, Yuma, and Mohave who utilized the seed and greens for the high protein and fat content (Kindscher et al. 2018). This species quickly produces a large amount of biomass, a prolific amount of seed per plant (up to 500,000), and is known to have developed herbicide resistance in part due to its genetic plasticity and fecundity (Roberts et al. 2022). These characteristics likely caused the species to expand beyond its native range with seeds accidentally dispersed through the crop and seed trade. This species became a problematic weed in US agriculture in the early 1990s (Ward et al. 2013). The emergence of *A. palmeri* as a major agronomic weed is relatively recent as it was not listed among the most troublesome weeds in a 1974 survey of the southern US (Buchanan 1974); its first appearance in the annual survey of the Southern Weed Science Society occurred in 1989 (Webster and Coble 1997). Today Palmer amaranth is listed as one of, if not the, most economically damaging weeds in corn, cotton, sweet potatoes, and soybean in the US.

Although this troublesome weed is so widespread, Palmer amaranth is known by many alternative common names such as carelessweed, Palmer's amaranth, dioecious amaranth, and pigweed. The scientific name, *A. palmeri* S. Watson, is found on a total of 460 herbicide labels, with the common name 'Palmer amaranth' is found on 405 labels, the common name 'carelessweed' is found on 94 labels, and 39 herbicide labels have both common names listed (Table 3). Typically, Palmer amaranth is the common name used by the agricultural community,

whereas in nonagricultural areas this species is commonly referred to as carelessweed, which is the common name listed for the species in the USDA PLANTS database. This distinction can be confusing, especially to people trying to control Palmer amaranth. Herbicide labels, scientific and extension publications, and plant databases are not always aligned on the naming of a species, and this may lead to future problems. Palmer amaranth is retained as the WSSA recognized common name and has been submitted as a synonym for *A. palmeri* in the PLANTS database.

#### Horseweed (*Erigeron canadensis* L.)

Depending on regional dialect, *Erigeron canadensis* is a weed of economic concern known by many names: horseweed, marestalk, Canadian horseweed, or Canada fleabane. Taxonomically, it is member of the genus *Erigeron*, also called fleabanes. It is known by taxonomic synonyms *Leptilon canadense* (L.) Britton, *Erigeron canadensis* L. var. *canadensis*, and *Conyza canadensis* (L.) Cronquist.. The plant has small, wind dispersed seeds that require light for germination (Gorski et al. 1977). It has high dispersal capability, is well adapted to no-till agriculture, and has been considered first on a list of ten most important weed species (Basu et al. 2004). The species is competitive with crops and can reduce soybean yields by up to 90% (Bruce and Kells 1990). The first confirmed case of glyphosate resistance documented in the United States was in *E. canadensis* populations in Delaware (VanGessel 2001). The plant has a wide geographic distribution. Although it is native to North America, it has become naturalized and is now a highly abundant, globally dispersed species (Weaver 2001; Thébaud & Abbott 1995).

The wide geographic distribution of *E. canadensis* has led to a divergence of popular common names by geography. The PLANTS database currently lists Canadian horseweed as the common name of this species. In the US agricultural community, the most popular common names are horseweed and marestalk. In a search of herbicide label occurrence, horseweed was found on 611 labels, while marestalk was found on 638 (Table 3). Canada fleabane was not found on any US herbicide labels. In Canada, there were nine herbicide labels that mentioned horseweed and three that mentioned marestalk, while 327 labels listed Canada fleabane (Health Canada 2023). Horseweed is retained as the WSSA recognized common name and will be included as a synonym for *E. canadensis* in the PLANTS database after this review. We have



suggested that the regionally important name ‘marestail’ should also be included as a synonym in PLANTS.

#### Downy brome (*Bromus tectorum* L.)

Downy brome was listed as the accepted common name for *Bromus tectorum* L. on the first list of weed names adopted for the Western Weed Control Conference in 1956 (now Western Society of Weed Science). Prior to standardization of plant names, downy brome, downy chess, junegrass, cheatgrass, and downy brome grass were all used as common names for *B. tectorum* in scientific communications. The journal Weeds (now Weed Science) published downy brome as the accepted common name after the adoption.

Downy brome is one of the most significant invasive weeds in the western United States because it reduces forage quantity and quality, alters wildfire regimes, impacts species diversity, reduces wildlife habitat, and competes with winter wheat and grass seed production. Ranchers graze cattle on it in early spring as it has replaced native prairie grass, and it burns readily in rangeland. In the national conversation, the common name used by ranchers and foresters, cheatgrass, was thrust to the public space and popular press on the problem. In consequence, there has been increasing pressure to adopt this name, especially in competition for research funding.

A search of herbicides labels in 2023 returned 420 with downy brome and 245 with cheatgrass listed (Table 3). Most of the 245 listed synonyms for *B. tectorum* L. as downy brome/cheatgrass. Most new herbicide products (group 1, 2 and 15) have downy brome listed on the label. A newly registered Esplanade (group 29) label has downy brome (*B. tectorum* L.) and cheatgrass (*Bromus secalinus* L.). The WSSA accepted common name for *B. secalinus* L. is cheat. The same active ingredient as Esplanade under the Rejuvra label has “Downy brome/Cheatgrass” for *B. tectorum* and “Cheat grass” for *B. secalinus* L. Older labels have additional inconsistencies, for example, some atrazine labels have “cheatgrass (downy brome, chess)”. The CLW lists two chess species, hairy chess (*B. commutatus* Schrad.) and Australian chess (*B. arenarius* Labill.). Some herbicide labels have *B. tectorum* L. listed and not *B. secalinus* L. as being controlled.

Certified seed labels, like herbicide labels, usually include common names for the weed contaminants due to the target users. Grass seed produced in Oregon, Idaho and Washington is shipped all over the USA and internationally. There are many exports that can be affected, as

foreign countries may prohibit imports of grass seed contaminated with one or more of these weed species. Changing the names of the seed contaminants would introduce confusion as *B. secalinus* occurs in this same region as *B. tectorum*.

After much discussion among the committee, downy brome is retained as the WSSA recognized common name and has been included as a synonym for *B. tectorum* in the PLANTS. Adoption of the nationally popular name ‘cheatgrass’, may work well to promote research on the species *B. tectorum* alone, but could cause confusion where both species are present: *B. secalinus* (cheat grass) and *B. tectorum* (cheatgrass). In the future, the society may consider a new name for *B. secalinus* to avoid confusion with the already prevalent name of the separate species.

#### Rocky Mountain beeplant (*Cleome serrulata* Pursh)

Rocky Mountain beeplant (*Cleome serrulata* Pursh) is a native annual species with a wide distribution across a large area of the United States and it was listed on the first CLW (Report of the Terminology Committee 1960). As an annual and early successional plant species (ruderal) it shares some species attributes with many agronomic weeds which include relatively quick establishment from seed, prolific seed set, high N tolerance, the ability to easily occupy disturbed habitats, and a relatively short life cycle. These very characteristics that contribute to its “weedy” nature are also sometimes sought out for habitat establishment in environmental conservation projects. In the context of conservation and ecosystem restoration activities, plants such as *C. serrulata* in effect act as a native cover crop during the early phases of plant community development by occupying a short-term ecological niche. This reduces the likelihood of invasion by nonnative noxious weed species during the time it takes for slower-growing native plant species to establish later in succession.

The WSSA definition of a weed (WSSA 2016) is, “a plant that causes economic losses or ecological damage, creates health problems for humans or animals, or is undesirable where it is growing”. This definition provides a broad interpretation of the term “weed” and could create confusion regarding the possibility of some plant species behaving as a problematic weed in some contexts and as a valued native species for the establishment of conservation habitat in others. In the case of *C. serrulata*, including the species in the CLW implies that it fits the definition of a weed, but a search of the WSSA journals Weed Science, Weed Technology, and Invasive Plant Science and Management found no articles that mentioned *C. serrulata* as a problematic weed. In cases such as this, additional metadata could be added to the CLW to

indicate how invasive a species could be or in what habitats it is considered a weed, to provide additional contextual information needed for responsible management. This is a challenge mainly with publishing a national database and the broad understanding of ‘weed’ overall. *C. serrulata* was already referred to by the same common name in both the CLW and PLANTS databases, but it is discussed here as a case study to highlight that many plant species have been included in the CLW which are not inherently weedy, including crops, trees, and native plants important for conservation. Such cases should prompt more thoughtful presentation and consider the implications of including such plants on a list called Composite List of *Weeds*.

### ***Implications of WSSA having a composite list of ‘weeds’***

Recognizing that there are implications to publishing a database on the internet listing standard names for weedy plant species, the Standardized Plant Names committee has aspirations to improve the usefulness of this list for our members and reduce confusion to outsiders that come across our list. A list of several thousand plants cannot be assumed to be ‘weedy’ in every habitat, but at the same time most plants could be in need of management or control under certain circumstances and need to be listed on herbicide labels. One way to address this is to refer to the CLW as a list of plants which have the potential to be considered as “weeds” commonly encountered in vegetation management. An explanation or disclaimer can even be stated on the public webpage to clarify the broad approach by which plants have been added to the list. Even an explanation of ‘weediness’ might not be enough as in some conservation efforts, plants with weedy traits such as aggressive establishment might be important pioneer species and yet not be inhibitory to further native establishment.

While there have been attempts to change names that were disparaging, there are categories of names that may yet be perpetuating unintentional marginalization, especially when names are not indicating a true country of origin but have become associated with some stereotype.

### **Conclusion**

Even though the original purpose for the Society to establish a composite list of weed names is no longer necessary, the list has preserved many culturally significant names which could be recommended to the PLANTS database for inclusion and cross-referencing. There were other instances where names in the CLW were changed or amended. We identified three reasons that were most important 1) remove inaccurate or inappropriate names 2) simplify spelling where

it does not affect how the name is pronounced, and 3) reduce confusion between plant species. Additionally, there are other insights gained from undertaking this lengthy review process: 1) the list could benefit from more regular review; 2) the accessibility of the online database has greater potential to provide context for what habitats listed species are ‘weedy’; and finally, 3) especially as new regulations come out, there is a need to cross-reference federal and state- threatened and endangered species.

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### **Competing Interests**

The authors declare none.

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**Table 1.** Table of common names in the Weed Science Society of America Composite List of Weeds (WSSA CLW) with the word ‘common’ as a descriptor.

WSSA Common Name	EPPO Code	Scientific Name
common agrimony	AGIGR	<i>Agrimonia gryposepala</i> Wallr.
common arrowhead	SAGLT ODOV	<i>Sagittaria latifolia</i> Willd.
common bartsia	U UTRV	<i>Odontites vulgaris</i> Moench
common bladderwort	U	<i>Utricularia vulgaris</i> L.
common blue violet	VIOPP	<i>Viola sororia</i> Willd.
* common borage	BOROF GUED	<i>Borago officinalis</i> L.
common broomweed	R ANCO	<i>Amphiachyris dracunculoides</i> (DC.) Nutt.
* common bugloss	F	<i>Anchusa officinalis</i> L.
common burdock	ARFMI CRYC	<i>Arctium minus</i> (Hill) Bernh.
common caraway	A HRYR	<i>Carum carvi</i> L.
common catsear	A TYHL	<i>Hypochaeris radicata</i> L.
common cattail	A	<i>Typha latifolia</i> L.
common chickweed	STEME PRNV	<i>Stellaria media</i> (L.) Vill.
* common chokecherry	G	<i>Prunus virginiana</i> L.
common cocklebur	XANST SYMO	<i>Xanthium strumarium</i> L.
common comfrey	F	<i>Symphytum officinale</i> L.
* common cordgrass	SPTAN	<i>Spartina anglica</i> C.E. Hubbard
common cornsalad	VLLLO	<i>Valerianella locusta</i> (L.) Lat.
common cottonwood	POPDE	<i>Populus deltoides</i> W. Bartram ex Marshall
* common crupina	CJNVU	<i>Crupina vulgaris</i> Cass.
common curlymesquite	HILBE	<i>Hilaria belangeri</i> (Steud.) Nash
common duckweed	LEMMI	<i>Lemna minor</i> L.
common elodea	ELDCA	<i>Elodea canadensis</i> Michx.
* common evening primrose	OEOBI	<i>Oenothera biennis</i> L.
common falsepimpernel	LIDPY	<i>Lindernia procumbens</i> (Krock.) Philcox



common fiddleneck	AMSIN	<i>Amsinckia intermedia</i> Fisch. & C.A. Mey.
common flax	LIUT	<i>Linum usitatissimum</i> L.
* common four o'clock	MIBJA	<i>Mirabilis jalapa</i> L.
common goldenweed	IOCCO	<i>Isocoma coronopifolia</i> (A. Gray) Greene
common groundsel	SENVU GRNC	<i>Senecio vulgaris</i> L.
common gumplant	A	<i>Grindelia camporum</i> Greene
* common hawkweed	HIELA	<i>Hieracium lachenalii</i> Suter
common hempnettle	GAETE	<i>Galeopsis tetrahit</i> L.
common juniper	IUPCO	<i>Juniperus communis</i> L.
common knotweed	POLAR	<i>Polygonum arenastrum</i> Boreau
common lambsquarters	CHEAL	<i>Chenopodium album</i> L.
common lespedeza	LESST	<i>Kummerowia striata</i> (Thunb.) Schindl.
* common mallow	MALN	
	E	<i>Malva neglecta</i> Wallr.
common manzanita	ARYM	
common	A	<i>Arctostaphylos manzanita</i> Parry
mediterranean grass	SHIBA	<i>Schismus barbatus</i> (L.) Thellung
common milkweed	ASCSY	<i>Asclepias syriaca</i> L.
* common mullein	VESTH	<i>Verbascum thapsus</i> L.
* common periwinkle	VINMI	<i>Vinca minor</i> L.
common persimmon	DOSVI	<i>Diospyros virginiana</i> L.
	PHTA	
common pokeweed	M	<i>Phytolacca americana</i> L.
common purslane	POROL	<i>Portulaca oleracea</i> L.
	AMBE	
common ragweed	L	<i>Ambrosia artemisiifolia</i> L.
common reed	PHRCO	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.
	RUAG	
* common rue	R	<i>Ruta graveolens</i> L.
	ARTC	
common sagewort	M	<i>Artemisia campestris</i> L.
common salsify	TROPS	<i>Tragopogon porrifolius</i> L.
common saltwort	SASKA	<i>Salsola kali</i> L.
	HENA	
common sneezeweed	U	<i>Helenium autumnale</i> L.

common snowberry	SYPAL	<i>Symphoricarpos albus</i> (L.) S. F. Blake
common speedwell	VEROF TRAO	<i>Veronica officinalis</i> L.
common spiderwort	H	<i>Tradescantia ohiensis</i> Raf.
common spikeweed	HEZPU	<i>Centromadia pungens</i> (Hook. & Arn.) Greene
*common St. Johnswort	HYPPE	<i>Hypericum perforatum</i> L.
common stock	MTLIN HELA	<i>Matthiola incana</i> (L.) W. T. Aiton
common sunflower	N LTHO	<i>Helianthus annuus</i> L.
common sweetpea	D CHYV	<i>Lathyrus odoratus</i> L.
common tansy	U	<i>Tanacetum vulgare</i> L.
common teasel	DIWSI SCPA	<i>Dipsacus fullonum</i> L. <i>Schoenoplectus americanus</i> (Pers.) Volkart ex Schinz
common threesquare	M	& R. Keller
common valerian	VALOF HOLL	<i>Valeriana officinalis</i> L.
* common velvetgrass common	A	<i>Holcus lanatus</i> L.
venuslookingglass	TJDPE	<i>Triodanis perfoliata</i> (L.) Nieuwl. var. <i>perfoliata</i>
common vetch	VICSA WOLC	<i>Vicia sativa</i> L.
common watermeal	O	<i>Wolffia columbiana</i> Karst.
common waterplantain	ALSPA LUUM	<i>Alisma plantago-aquatica</i> L.
common woodrush	U	<i>Luzula multiflora</i> (Ehrh.) Lej.
common yarrow	ACHMI	<i>Achillea millefolium</i> L.

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\* Notes species common names that were changed in the review.

**Table 2.** Summary of changes to the Weed Science Society of America Composite List of Weeds (WSSA CLW) from 2017 to 2023 according to justification and comparison to the database by United States Department of Agriculture Natural Resources Conservation Services Plant List of Attributes, Names, Taxonomy, and Symbols (USDA NRCS PLANTS).

Justification	Suggested changes	Match PLANTS	Closer to PLANTS
a) Inappropriate or inaccurate names	14	7	4
b) Reducing punctuation	206	71	5
c) Adding spaces in compound words that are confusing or cumbersome	71	31	2
d) Adding elements of the PLANTS name when CLW name is non-specific or when the PLANTS name is more widely used or it is less popularly referenced a weed	32	29	3
e) When small changes in ending or capitalization could harmonize with PLANTS	18	17	1

**Table 3.** Search terms related to three weeds and the number of search results in different databases.

search term	Telus agriculture label database		CDMS label database	Weed Sci articles 2023	1968- Weed Technol articles 2023	1987- articles Web of Science
	US	Canada				
<i>Amaranthus palmeri</i>	0	0	0	117	169	70
Carelessweed	151	0	98	4	0	-
Palmer amaranth	0	0	424	137	278	78
Palmer pigweed	0	0	55	0	0	1
*Palmer	0	0	461	679	817	-
*Amaranth	839	19	546	683	880	-
*Pigweed	1865	266	1177	1652	1197	-
<i>Conyza canadensis</i>	0	0	0	60	55	46
<i>Erigeron canadensis</i>	0	0	0	4	4	25
Horseweed	981	1	617	313	444	-
Marestail	1057	1	645	17	30	-
Canada fleabane	0	0	0	1	2	1
*fleabane	718	34	429	125	117	-
<i>Bromus tectorum</i>	0	0	0	90	50	58
Downy brome	0	0	420	92	56	22
Cheatgrass	358	6	245	68	37	99
Chess	183	0	106	59	11	-
*Cheat	394	5	362	88	106	-
*Brome	812	105	492	636	343	-

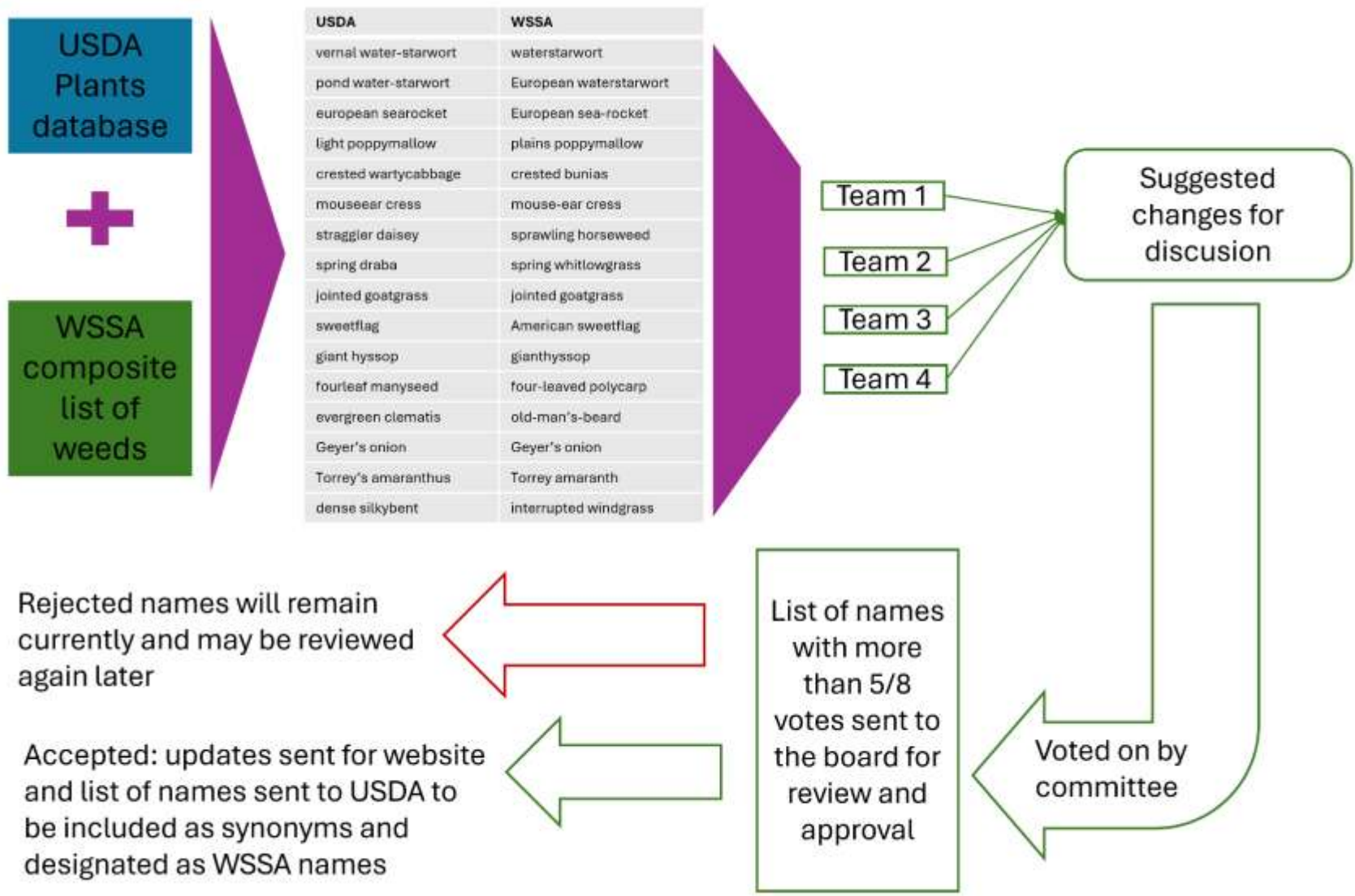
\*not a synonym but could be a confused term in search

<https://agrian.com>. Accessed September 26, 2023

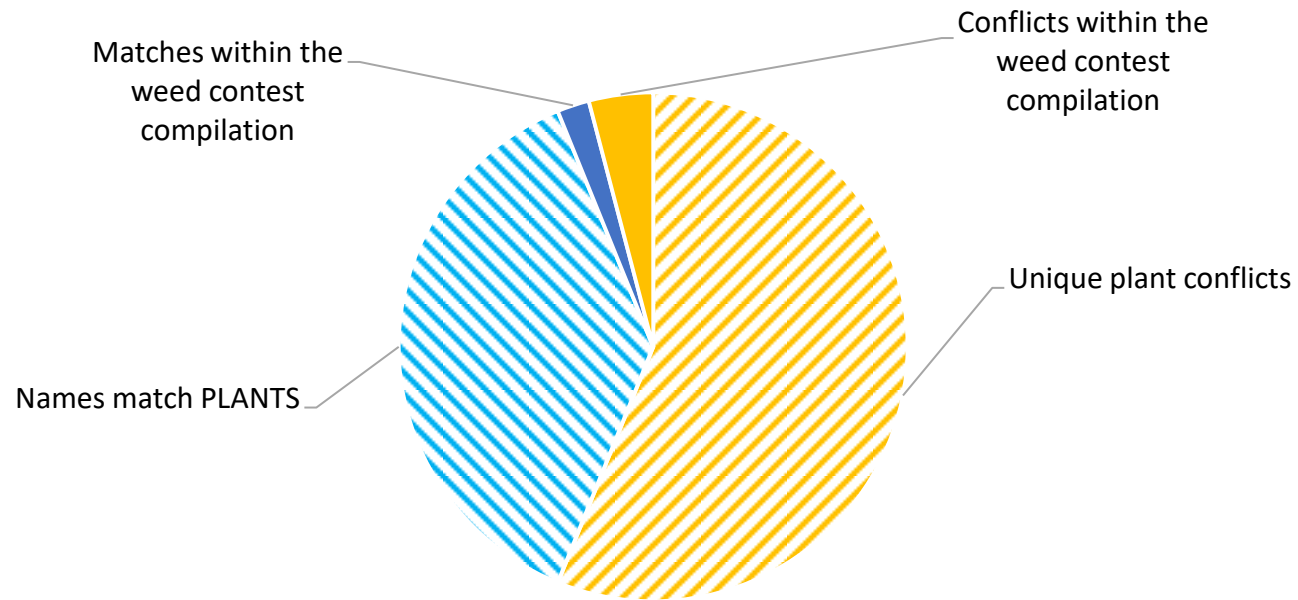
<https://www.cdms.net/labeldatabase/Advanced-Search>. Accessed September 26, 2023

<https://www.cambridge.org/core/jour-ls/weed-science> Accessed September 26, 2023

<https://www.cambridge.org/core/jour-ls/weed-technology> Accessed September 26, 2023

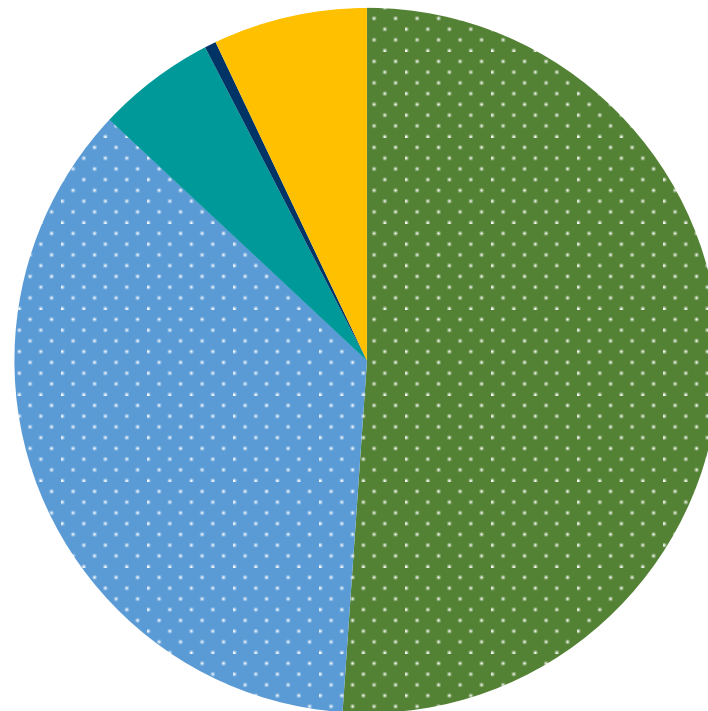


**Figure 1.** Illustration of committee review workflow.



**Figure 2.** Conflicts between the Weed Science Society of America Composite List of Weeds (WSSA CLW) and United States Department of Agriculture Natural Resources Conservation Services Plant List of Attributes, Names, Taxonomy, and Symbols (USDA NRCS PLANTS) common names in 2020 at the review initiation. Matches are in blue and conflicts in yellow. Solid colors represent names which have been included in a weed contest list in the past 15 years.

- WSSA names DISAGREE with USDA but not suggested to change
- WSSA names AGREE with USDA and not suggested to change
- P23 suggested change now matches USDA
- P23 suggested change now closer match to USDA
- P23 other suggested changes



**Figure 3.** Overview of suggested changes. Green and blue with polka dot pattern were not changed from the 2017 version of the list.