

# **A GLOBAL COMPENDIUM OF WEEDS**

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## Introduction

I first started collecting data for this project back in 1996 when I typed a species list from Martin Hanf's "The arable weeds of Europe, with their seedlings and seeds" into an Excel spreadsheet. As I only had the book on a short term loan I wanted to maintain a list of the taxa it covered for future assessments. As with many collecting type situations this habit of documenting weed lists got a bit out of hand with flora lists, nursery stock lists in fact any list of plant names tied to a data source being assiduously collected all being poured into a database. This database forms the backbone of my weed potential assessment process allowing me to rapidly ascertain a weedy history for any new species being assessed but also often determining its origin, where it has naturalised, if it is used in the horticultural trade etc.

This weed related data has been extracted to allow everyone the chance to rapidly determine for themselves if a plant has a weedy history as this is the single most important indicator of a species weed potential over all other attributes.

The data presented in this web site distillation of six years work sourcing all the significant weed references I could find. While there are some journal articles included the main thrust has been to capture sources with large numbers of weed species documented. A search of CAB abstracts for the last 10 years will find over 30,000 journal articles that contain the key word "weed". Indexing and extracting a species list from this dataset would take years but with an agricultural bias is highly unlikely to cover more than a fraction of the weeds covered here. Previously the most significant coverage of the worlds weed flora was Holm, *et al's* "A Geographical Atlas of World Weeds" (1979) listing 6,400 weed species. This compendium has 20,630 entries including approximately 2,000 synonym entries. A final species count will be possible after these synonyms have been cross indexed against the other entries but there will be well over 18,500 discrete weedy taxa documented. 25,500+ common names and 10,600+ other synonyms are also listed. There are 285 referenced data sources covering 11 continental regions and roughly 46 countries, not counting the many countries covered in "A Geographical Atlas of World Weeds".

While this compendium represents a huge increase in the number of documented weed species globally it is by no means the total weed flora of the world. While people to continue to move plants around the world with little regard for the consequences of their actions new weeds will continue to appear. If ever a point arrives where all countries screen new plant introductions as carefully as they screen potential new (human) immigrants we may eventually see a levelling off of the number of reported new weeds.

I aim to have this data published as a book in 2002. While the internet and computers can make life very easy (sometimes) a book requires no power to read (apart from literacy), is more portable and in my view reaches a greater potential audience than any website ever will. Remember that while the web may be with us for a long time its content will change over time and there are no guarantees that any data will be available forever. Some of the web sources cited in this very dataset have since disappeared highlighting the ephemeral nature of data on the internet.

## Record Structure

Each record comprises:

**Genus, species, Author:** Name as published by the source author/s and may be a synonym itself, this is indicated with an '=' followed by the accepted name in the field following the Family name. The taxonomy of weeds is very fragmented and many texts use old names. Rather than update these old names they have been left as published by the source author and linkages between the related names are indicated by the use of the "=" and (see) symbols. (NoR) means there are no other related records for this name. While all effort has been made to determine all the appropriate linkages between related records it is possible some may have been over looked or indeed never determined. Also some accepted names are often controversial and some readers may not agree with those selected in this text. With the large number of sources used to determine synonymy the author commonly encountered differences of opinion as to the correct name. This was another reason why published names were not changed, so readers can follow their own understanding of synonymy through the text without the added confusion of numerous records all lumped under one name

### Family

**Synonyms** or Equals (=): All known other names from the database listed

**Common names:** All common names from the database included

**Status:** A group of relatively standard descriptors were used to form the status field of the dataset.

### Weed

The reference source was not specific but in most cases these are economic weeds ie agriculture, horticulture, turf, nurseries etc. The source details can usually give some idea of the type of weed but is not conclusive in all cases.

- Sleeper Weed** Species that have been identified as present and posing a future threat. Often the source of these references has already been proved correct by other publications acknowledging the species impacts.
- Quarantine Weed** Species prohibited entry under a countries quarantine regulations
- Noxious Weed** Species subject to legal restrictions (ie control, eradication, containment etc) for some countries this term also encompasses quarantine species (ie US Federal Noxious Weeds)
- Naturalised** Species has self sustaining and spreading populations with no human assistance but not necessarily impacting on the environment. A species capacity to naturalise in foreign environments however is a good indicator of weed potential.
- Native Weed** Species that are native to the country they are considered weedy. Sometimes difficult to determine if the species has spread outside its native range within its country of origin or is weedy within its native range as sources are often state or regionally based.
- Introduced** Species that have been released (planted) that may or may not have become naturalised. A term that is often used as an alternative to naturalised and sometimes very difficult to determine which term is appropriate. Introduced taxa obviously include many species deemed desirable by humans for one purpose or another and many weeds enter countries via this pathway. Forestry, agriculture and horticulture are traditionally the biggest advocates of species introduction programs. Lately overseas aid agencies have become involved in regeneration projects and rather than use native species often introduce exotic species with little regard to their future weed potential.
- Garden Escape** Garden species known to have escaped either directly by seed or other propagules moving out of the garden or indirectly by establishing from dumped garden waste. Other garden escapes originate from abandoned gardens, graveyards and commercial tips to name just a few.
- Exotic** Rarely used here but denotes where a species is know to be present but its exact status is unknown
- Environmental Weed** Species that invade native ecosystems. Many of these can be easily determined from the source references. In the past most attention has focused on agronomic weeds, this dataset provides information on over 2000 environmental weed species.
- Cultivation Escape** Species may have escaped from gardens, cultivation or both, source not specific but includes some crop and pasture species.
- Casual Alien** These species appear with no direct (apparent) human assistance, survive, possibly set seed, but do not persist, then may appear again some seasons later, i.e. they do not develop long term sustained populations.

**Source Codes:** References cited

**Arid/Aquatic:** This section is a basic measure of a plants ability to survive or thrive in either environmental extreme either by avoidance or adaptation. Some species can survive either extreme while others can only establish in a period of good conditions. This listing like many of the following is not complete and is only an indication of a species capacity to grow under the two extremes of moisture availability. Some species noted as "Arid" may be annuals that only appear in good conditions, set seed, then die off. Perennials may only establish under 'good conditions' then survive extreme droughts by accessing ground water, use of water loss avoidance techniques, specialised physiology or water storage mechanisms. Some "Aquatic" species may be more correctly described as marsh or intertidal species and some marine taxa are also listed. The intent being to flag a species capacity to survive under very wet conditions.

**Cultivated or Promoted:** Plants that are cultivated by man, or promoted as a species worthy of cultivation, which in many cases are garden plants but also includes some crops. Cultivated plants with their generally long association with man are often the first species to invade

**Herbal:** Plants that are used for ceremonial, medicinal or culinary purposes, often only by traditional users. This should not be considered the same as cultivated as often these species will be wild harvested and often used only under extreme conditions of drought or famine ie some of these plants are not eaten by preference but by availability

**Toxic:** Where a species is documented as toxic. Degree and parts that are toxic is often difficult to determine as many sources do not indicate this. Degree of toxicity and the varying susceptibility of different species from man to livestock should all be considered.

**Origin:** This can be difficult to determine as often sources will quote conflicting origins, where this occurs an origin is cited only if there is a clear majority. Conversely if there is only one source indicating an origin its validity may be difficult to determine. Many thousands of origins were not cited because of the difficulty in validating some sources

An example from the text:

***Opuntia ficus-indica* (L.) Mill.**

Cactaceae

Cactus ficus-indica L., *Opuntia castillae* Griffiths, *Opuntia compressa* (Salisb.) Macbr. (see), *Opuntia incarnadilla* Griffiths, *Opuntia megacantha* Salm-Dyck (see), *Opuntia occidentalis* Engelm., *Opuntia vulgaris* Mill. (see)

- Indian fig, tuna cactus, sweet pricklypear, mission pricklypear, prickly pear, spineless cactus, Boereturksvy,

grootdoringturksvy, spiny pest pear

- Weed, Quarantine Weed, Noxious Weed, Naturalised, Introduced, Garden Escape, Environmental Weed, Cultivation Escape

- 10, 34, 51, 63, 72, 76, 86, 87, 88, 95, 98, 101, 121, 151, 152, 158, 198, 203, 228, 261, 269, 272, 278, 279, 283, 287

- Arid - Cultivated - Herbal - **Toxic** - Origin: Central America.

**Nomenclature and Errors**

Every attempt has been made to retain the original species names as supplied by the authors in each source. At times, where there have been spelling errors, some records have been changed and more than likely, but hopefully not too frequently, some errors may have been made at this end of the data daisy chain. Some spelling errors or variations may not have been detected in the screening process when adding new data sources and some taxa may have more than one record a situation I worked hard to eliminate but the sheer number of names to check and recheck means there are bound to be some errors of this type also. For these and any other errors I take full responsibility and apologise in advance. I would certainly appreciate if any reader finds an error that they contact and advise me of the problem so I can correct it.

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**Cascading Sources**

Sharp eyes will quickly recognise that several sources regularly appear together. This should be in no way be taken as a measure of a species weediness but rather give greater awareness of the source of the original data which has prompted this cascade of reporting, ie an original reference being continually cited by other authors. This phenomenon is certainly not new, nor restricted to the study of weeds, but for those not aware of it, could be misleading. Two references which appear to copiously quoted are N° 218 (Darrow, R.A., Erickson, L.C., Holstrum, J.T. Jnr, Miller, J.F., Scudder, W.F. and Williams, J.L. Jnr. (1966). Report of the Terminology Committee, Standardized Names of Weeds. WSSA (14) 346-386 Weed Science Society of America USA), a large list of weed names also included in N° 87 (Holm, L. G., Pancho, J. V., Herberger, J. P. and Plucknett, D. L. (1979). *A Geographical Atlas of World Weeds*. John Wiley and Sons New York, USA), another heavily quoted weed reference. Hence these two source codes appear throughout this text as well as N° 88 (FAOs Global Pest Plant Information Service, now EcoPort), which also cites N° 87 (Holm *et al.*).

**Naturalised and Introduced**

The use of both 'Naturalised' and 'Introduced' as status terms may confuse some people and in many cases are freely exchanged by authors. I have tried to determine whether or not a species is considered naturalised ie "has self sustaining and spreading populations with no human assistance" or introduced "plant populations are self sustaining but have not yet spread beyond their original point of introduction".

Where both terms are used for the same species then both are presented. In most cases it more than likely the author means 'naturalised' but the source has not made this clear enough to absolutely determine this.

**Interpreting the Data**

In my view the best measure of a species weediness that can be drawn from this work is the number of sources combined with the range of weed types that have been allocated. For example a species may have 12 sources attributed (taking into account any cascaded sources) but is only ever considered a 'weed' in the status section.

Another species may have six sources but be considered a noxious, quarantine and environmental weed plus a garden escape and casual alien. I would consider the second species a greater potential threat.

## Sources

I intend to give as much detail about each source as possible. For most published books and articles the conventional citation is usually sufficient but if it would assist the reader any other appropriate information will be included. For Web sites, databases and other online sources a small description of the information the site offers will be included. There are several “personal communication” sources, these will provide as much information and background as necessary to validate the credentials of the source.

Also provided will be a geographically sorted list of the source codes to assist people in compiling regional weed lists.

The Database that was used to construct this document contains 990,000 taxa records from over 650 data sources, (285 being weed related sources) including the complete floras of Australia, the USA and North America and numerous naturalised floras from various other countries and states. These range in size from a handful of records, from the pers comms, up to 85,000 records for the Flora of North America.

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