

## Abstract

The Weed Traits Database (WTDB) is an open database residing on Internet. It provides information about weed traits and parameters for the species most important to European agriculture. WTDB is managed by the ENDURE RA4.5 Working Group but is open for research purposes for the whole scientific community. This document describes the parameters contained in WTDB.

## 1. Introduction

The parameters have been chosen to allow use of WTDB in the Usage Scenarios described in the *WTDB Requirements Document* [[www.agrsci.dk/herbtol/ra45/database/requirements.html](http://www.agrsci.dk/herbtol/ra45/database/requirements.html)].

A separate document will describe how to enter parameter values and associated metadata (e.g. bibliographical source, location, crop, soil, climate) into WTDB.

## 2. Basics

Parameter names are written in capitals.

Parameters that together describe a certain functional relationship have the same name but are distinguished by an index, e.g. FECUNDITY[1] and FECUNDITY[2] which are used to calculate seed production ( $y$ ) from plant biomass ( $x$ ):

$$\ln(y) = \text{FECUNDITY}[1] \cdot \ln(x) + \text{FECUNDITY}[2]$$

## 3. Germination Parameters

Parameter	Description
GERMCAL[1..12]	Germination calendar containing relative percentage germination for each month totalling 100% for the whole years. Several calendars can exist for the same species; metadata tells for which climate the calendar is typical.
GERMTOT[1..2]	Total percentage germination per year in disturbed [1] and undisturbed [2] soil.
GERMBASE	Base temperature for germination, i.e. lower soil temperature threshold below which no germination happens.
GERMCHILL	Is there a chilling requirement to break primary dormancy? The requirement can be absolute, partial or none.
GERMLIGHT	Is there a light requirement for germination? The requirement can be absolute, partial or none.
GERMDEPTH[1..2]	Soil depth for emergence is given as the optimum [1], i.e. the depth from which maximum emergence was observed, and maximum [2], i.e. the deepest layer from which emergence was observed. If a function was used to summarise the data, the first parameter is the peak of the function and the second, the depth of 1% emergence.

#### 4. Seed Parameters

Parameter	Description
SEEDMASS	Air dried 1000-seed weight in mg.
SEEDCOAT	Percentage of total seed weight made up of non-investing structures (e.g. seed coat, awns, pappus)
SEEDPER[1..2]	Half-life of seedbank in undisturbed [1] and disturbed [2] soil, measured in years, assuming an exponential decay; i.e. if the decay is described by $y=a \exp(-bx)$ then the half-life is $\ln(2)/b$ .

#### 5. Phenology Parameters

Parameter	Description
PHENJUV[1..4]	Duration of juvenile growth stage, i.e. from emergence to flowering, given as the average [1] and variance [2] of the duration. The time scale can be days, day-degrees or photothermal time, in which daily day-degrees are multiplied by (day length minus base day length). As needed, the base temperature for day-degree calculation is given [3] together with base day length [4].
PHENFLO[1..4]	Duration of flowering stage, i.e. from beginning to end of flowering. Parameters [1..4] as above.
PHENMAT[1..4]	Duration of seed maturation, i.e. the period from a flower withers until its seeds have matured. Parameters [1..4] as above.

#### 6. Competition Parameters

Parameter	Description
COMPHPY[1..2]	Hyperbolic yield loss equation (Cousens 1985) given as the yield loss per plant at low weed density (Cousens' $i$ ) [1] and the maximum yield loss at high weed density (Cousens' $a$ ) [2].
COMPCON[1..6]	Conductance model of plant competition (reviewed by Benjamin 2007). A plot of $y=\ln(\text{leaf area})$ on $x=\ln(\text{shoot biomass})$ yields a slope [1] and intercept [2]. Another plot of $y=\ln(\text{crown zone area})$ on $x=\ln(\text{shoot biomass})$ yields another slope [3] and intercept [4]; 'crown zone area' means the area of the circle circumscribing the whole shoot as seen from above, i.e. a measure of how much the plant fills.  Finally we need the light extinction coefficient $k$ of de Beer's law [5] and the light use efficiency in g/MJ [6].
COMPHEIGHT	Maximum plant height at maturity in cm. This is likely to differ among agro-environments. Metadata should state the crop and soil conditions.
COMPRGR	Relative growth rate of shoot biomass per day or day-degree. This the growth rate in the early phase when growth is exponential.

## 7. Fecundity Parameters

Parameter	Description
FECUNDITY[1,2]	Fecundity in relation to mature plant biomass. A plot of $y=\ln(\text{seed production})$ on $x=\ln(\text{shoot biomass})$ yields a slope [1] and intercept [2].