HELMHOLTZ CENTRE FOR ENVIRONMENTAL RESEARCH – UFZ

The Grassmind Model Extension

Description of Usage in CANDY

Introduction

With the GRASSMIND model the CANDY model can simulate populations of plant species instead of single crops in the field management.

This document describes the details to use the GRASSMIND (Taubert 2014) model.

The combination of CANDY and GRASSMIND is still on a test level and is to be improved in some details to make the usage easier.

Requirements

Using the GRASSMIND model requires the additional file forgrassmind.dll in the same program directory as the CANDY.exe.

Furthermore several GRASSMIND specific parameter tables have to exist in the database:

GRASSMIND_PAR:	parameters of all selectable species
GRASSMIND_POPLIST:	definition of all populations usable for the field management
GRM_CROP:	composition of the populations with abundance of single species

Description of use

All populations in GRASSMIND_POPLIST need to be added as well to the table CDYPFLAN with the same *item_ix* and *name*. Further obligatory attributes in CDYPFLAN are: *art*=-1, *modell*='GRASSMIND' and *n_gehalt*=1.

The litter from a GRASSMIND population has still fixed properties and is to be defined in CDYOPSPA. The database demo_grm.mdb contains the record with *item_ix*=900 that is linked to the litter attributes (green, straw, root) in GRASSMIND_POPLIST and should not be changed with the current GRASSMIND version (Figure 1, red box).

The usage of GRASSMIND requires the definition of a certain plant population (Figure 1). Replace the "?" in the edit field with a new population name and add single species together with their abundance (as weights) in the data grid. The properties of existing populations can be changed after selection from the pop down menu. The litter quality of the population is up to now restricted to the grassmind_litter record in the CDYOPSPA table.

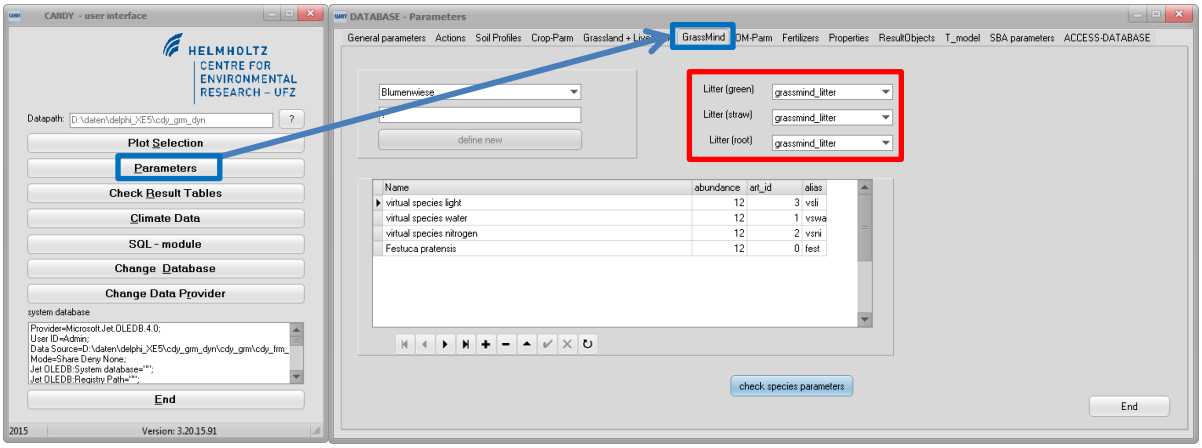

Figure 1: Activate the [GrassMind] sheet within the CANDY parameters (blue boxes) to edit the properties of a population with different species.

Properties of single species can be checked or edited after clicking [check species parameters] in the form shown in Figure 2.

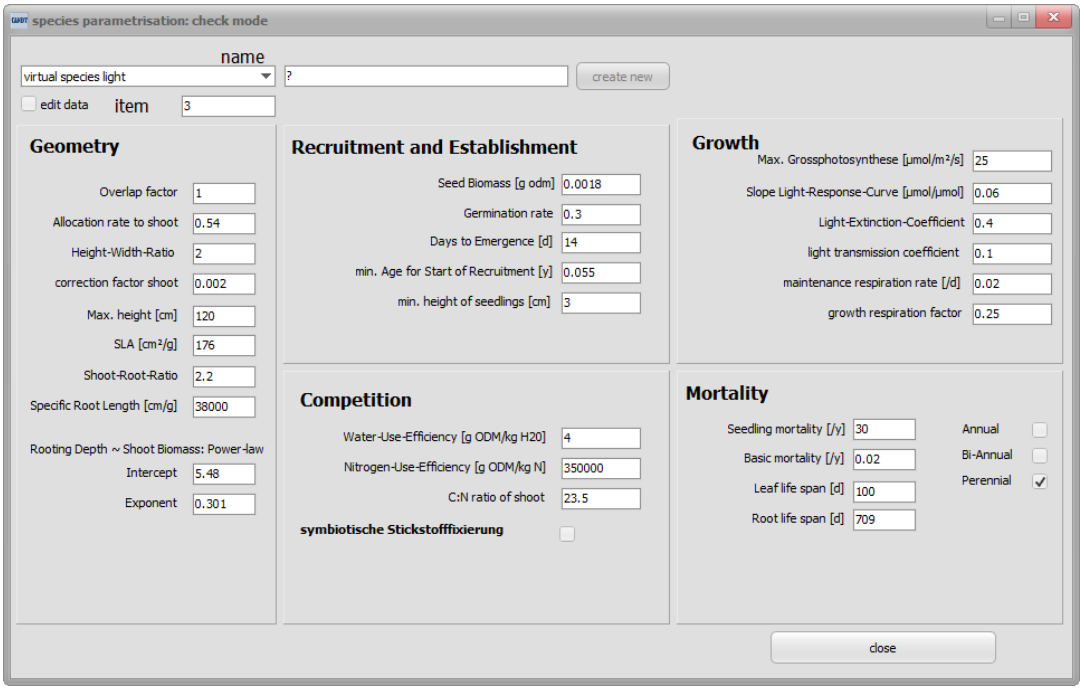

Figure 2: Parameterisation of single species

If a population with all species is properly defined it can be activated like any other crop with a sowing action in the management data (Figure 3). The input of a yield is not required - the value in this field has no meaning for the simulation.

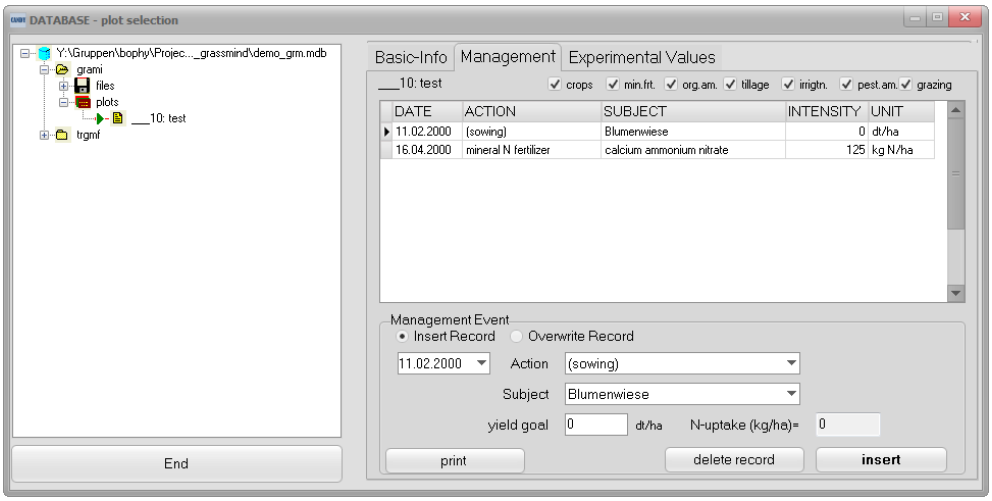

Figure 3: Integration of a GRASSMIND population in the management data

The result assessment for the single species requires a special preparation: please add the key 'debug' with the value 'xlsgrm' in the registry of candy switches (this is recommended only for experienced windows users).

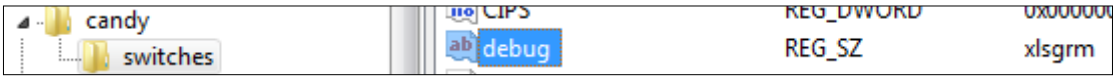

Figure 4: Registry record required to get an EXCEL output for all species

Now CANDY will fill an EXCEL sheet during the simulation run with selected properties of the species within a population: coverage, dry matter, rooting depth and plant height.

Attention, please wait until the simulation run is finished before using the created EXCEL sheet.

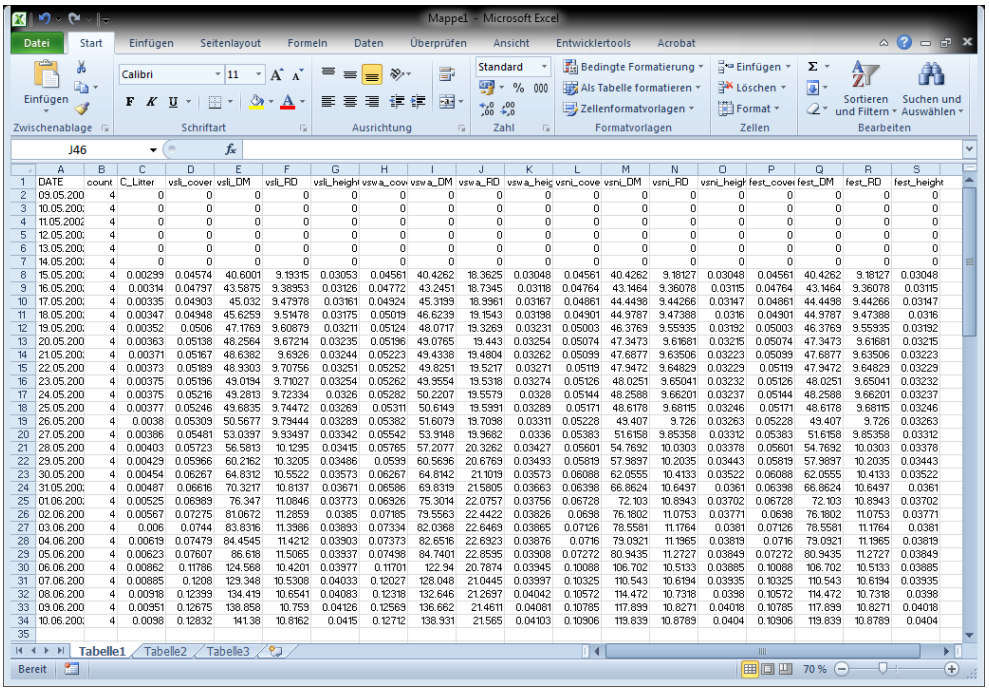

Figure 5: Example of an EXCEL output

Literature

Taubert, F. (2014). Modelling and Analysing the Structure and Dynamics of Species-rich Grasslands and Forests, Dissertation, University of Osnabrück. (https://www.ufz.de/export/data/global/56771_ufz-phddiss_05_2014_.pdf)