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HAIR2010 Software Manual

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J. Vlaming, R. Kruijne and J. Groenwold



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Abstract

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The HAIR instrument calculates risk indicators related to the agricultural use of pesticides in EU Member States on the basis of user provided usage data and compound properties. The remaining input data are provided by the software package and need not to be edited by the user. The HAIR software package includes databases and programs for calculating risk indicators and for visualisation and presentation of the output. The software manual includes some example cases based on the example compound databases and usage databases provided with the software package.

Keywords: risk indicator, environmental, occupational, pesticide, policy evaluation, EU, HAIR, software.

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Summary

This manual describes the use of the HAIR2010 software package. It explains the concepts and functionality of each of the three software tools Hair2010, HairOutputViewer and HairStudio. In addition the manual includes a quick start guide and a number of examples.

1 Introduction

1.1 Description and objectives

This manual describes the use of the HAIR2010 software package. It explains the concepts and functionality of each of the three software tools Hair2010, HairOutputViewer and HairStudio.

Hands-on examples for using the software are provided in the 'quick start guide' (Chapter 2) and the 'Example cases' in Chapter 6.

The software requirements and installation procedure are provided in Annex 7.1 and Annex 7.2 respectively.

1.2 HAIR2010 software tools

The HAIR2010 software package consists of three tools that are used together:

1. **Hair2010:** The main software module that allows the definition and selection of cases, performs the model calculations and save the results to output files.
2. **HairOutputViewer:** Reads the Hair output file, displays it in table format for viewing, creates summary reports and copies the data to the HairStudio tool.
3. **HairStudio:** Allows for the definition and creation of a variety of tables, graphs and maps based on imported Hair output data.

1.3 Databases

The HAIR2010 software requires three databases to operate. These three databases, from which input data is read, are briefly described below. A more detailed description can be found in the HAIR2010 Documentation, Chapter 1 (Kruijne et al., 2011).

Name	Description
Hair Database dbHair_{version}.mdb	Contains <ul style="list-style-type: none">– GIS data (areas, soil, climate)– Crop definitions– Miscellaneous definitions– Model parameter values– Configuration Maintained by: Alterra (recommended).
Compound Database dbCOMPOUND_{version}.mdb	Contains <ul style="list-style-type: none">– Compounds Maintained by: user Initial demonstration databases provided by Alterra.
Use Database dbUSE_{region}_{version}.mdb	Contains <ul style="list-style-type: none">– Application records Maintained by: user Initial demonstration databases provided by Alterra.

The Hair input data is split into three parts to make the information easier to maintain. The different types of information used in the model are expected to eventually originate from different sources which is facilitated by splitting the database accordingly.

1.4 Projects and cases

In Hair, a set of choices made by the user is generally referred to as a 'case'. A case is defined by an area of interest, crops and compounds and the year (range) for which calculations should be performed. By default all available indicators are calculated.

A 'project' is simply a collection of 'cases', each with its own selection of databases, areas, compounds and crops. It is up to the user to decide whether to add a new case to an already existing project, containing one or more existing cases, or to define a new project which will then initially only contain the new case. Cases cannot be moved or copied from one project to another.

Project definitions, with the cases that are part of them, are saved to file in XML (.xml) format.

2 Quick start guide

Follow the instructions in Annex 7.2 to install the software on your PC.

Start the Hair software from the Windows Start Menu, group HAIR2010, item Hair 2010.

Define a project:

- Create a new project (menu | Project | New) and enter at least the project name, [OK]

Define a case:

- Create a new case within the newly created project (menu | Case | New case). Enter a name for this new case.
- Next, select an Output folder to store the calculation results [...] and the three required databases (by default located in sub-folder “\database”) . The databases are selected in the order; Hair database, Compound database and Usage database. A message will pop up if the wrong type of database was selected.
- Finally, select the year range for which you want to calculate and wait for the program to load the Area selection and Compound and Crop selection pages.
- Proceed to the Area Selection page, select the scale level from which you want to select (either country or region) and use the buttons below the map to make the desired selection. Move the mouse pointer over the buttons to see the function per button.
- Proceed to the Compound and Crop Selection page. By default, nothing is selected for new cases.
- FOR TESTING PURPOSES: limit the selection of Areas, Compounds and Crops as the calculations may take a considerable amount of time!
- Save the Case (menu | Case | Save) and save the project as well (menu | Project | Save)

Run calculations:

- Proceed to the calculation screen (menu | Case | Calculation screen | or calculator icon)
- Click the [Start] button; the calculations will start and progress is shown a) in the map, b) above the map, and c) to the right of the map.
- Calculations can be aborted anytime but that means that the results are lost.
- The Log page will appear once the calculations are completed. This page shows the number of cells and applications processed and will refer to the Messages page if any issues occurred.
- The Messages page lists problems encountered during calculation

View the results

- Click the [View Hair Output] button at the bottom of the calculation page and HairOutputViewer will start.
- Click the [Open Last Output] button in the toolbar and the Hair results will load in the table.
- You can now browse through the results.

This Quick Start ends here. See Chapter 5 on HairStudio for more elaborate presentations of the same data.

3 Hair2010

3.1 Introduction

Hair2010 is the main software tool in the HAIR2010 package and is responsible for the calculation of indicator values based on user-defined cases. Users can define any number of cases in terms of underlying databases, period of analysis, area selection, compound selection and crop selection. Hair2010 then performs the indicator value calculations for the selected case and saves the results to an output file in csv format.

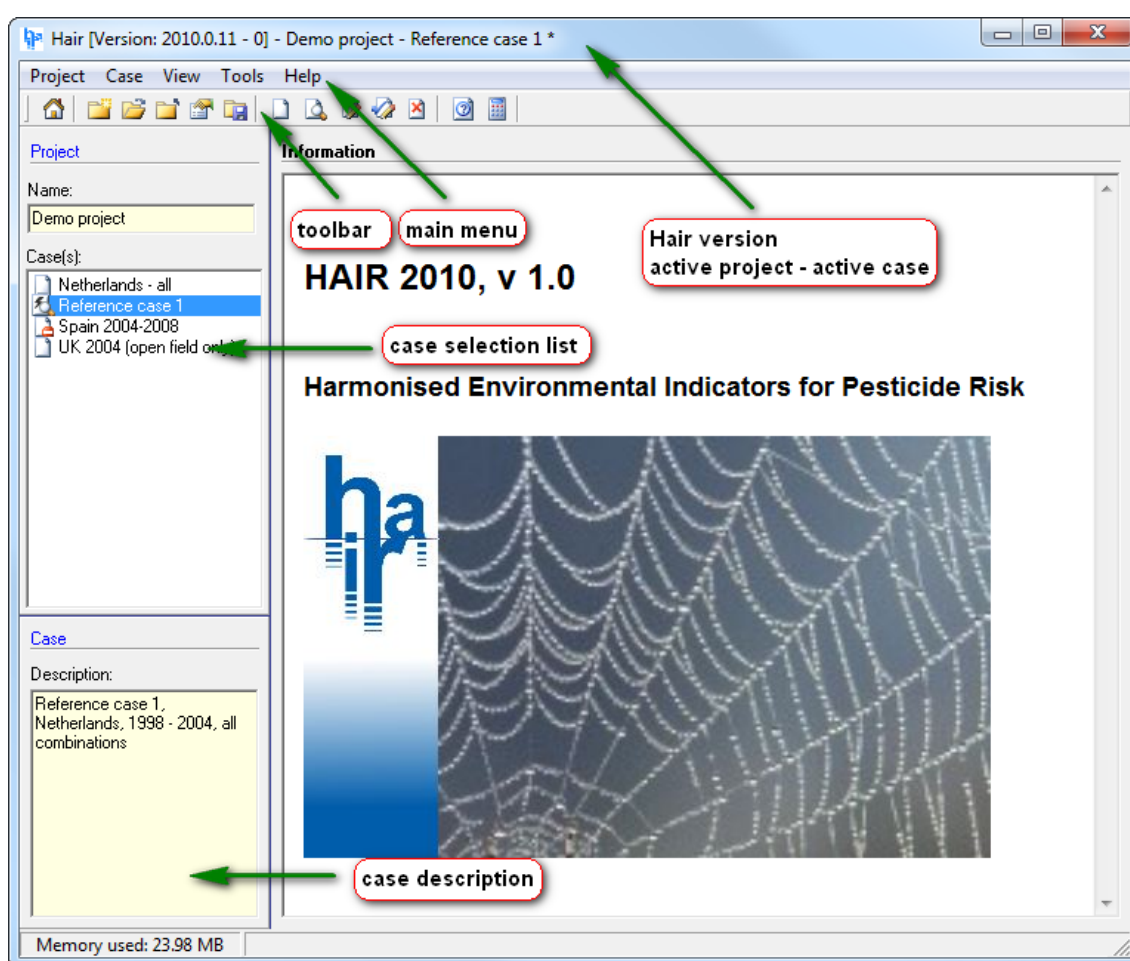


Figure 1
Hair2010 start page.

Additionally, Hair2010 provides insight in the relation between compound properties, replacement of those values by the missing value routine and the indicators that can be calculated based on the availability of compound properties.

The Hair2010 tool does not facilitate viewing and analysis of the results (HairOutputViewer and HairStudio are used for that purpose) nor does it facilitate the maintenance of its databases.
























Figure 2
Hair 2010 About box.

3.2 Main menu

The options and functionality of the items in the Hair2010 main menu are listed and explained in Table 1. Most of the menu functions are also present in the toolbar below the menu and they share the same name and icons.

Table 1
Hair2010 menu items.

Menu	Project	
	Home	Go to main page
	New ...	Create a new project
	Open ...	Open an existing project
	Save	Save current project
	Save As ...	Save current project with different name
	Close	Close current project
	Properties	Show project properties
	Exit	Exit application
Menu Case		
	Select Case ..	Opens the case selector (same as project information pane)
	New Case ...	Create a new case within the current project
	View Case ...	View selected case
	Edit Case ...	Edit selected case
	Save Case	Save selected case
	Delete Case	Remove the case from the current project
	Evaluate Case	Evaluate case definition
	Calculation screen	Show calculation screen
Menu View		
<input checked="" type="checkbox"/>	Project Info	Shows project information pane on left side of main screen (default=yes)
<input checked="" type="checkbox"/>	Case Description	Shows case description box at bottom of project information pane (default=yes)
Menu Tools		
	View Compound Status	
	View Hair Output	Starts HairOutputViewer
	Open Hair Data Folder	Opens folder containing the Hair data files
	Documentation ...	Opens the folder containing the (pdf) documentation.
	About ...	Shows the About box (Figure 2)

3.3 Projects

A Project is a collection of cases, each with its own selection of databases, areas, years, compounds and crops.

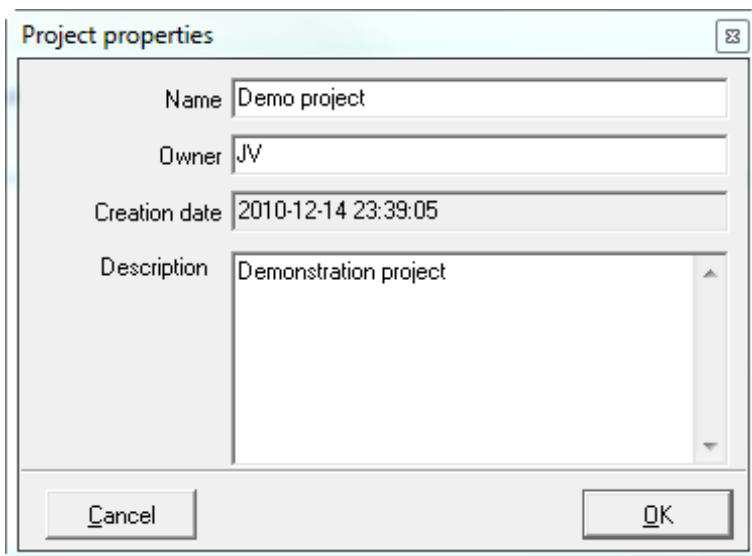
The configuration of a project, including its cases, is stored as a single file with extension '.xml' to a location given by the user when saving the project.

The software will remember the last project used whenever it is started. No projects will be present directly after installation so the user will have to define a new project when starting the software for the very first time.

The cases in a project are only really saved whenever the project in which they reside is saved. A message will appear if the user tries to close Hair2010 while there are unsaved changes to cases or project.

3.3.1 New project

A new project is created using the Create a New Project button  or through the main menu (Project | New ...)




The screenshot shows a 'Project properties' dialog box with the following fields and values:

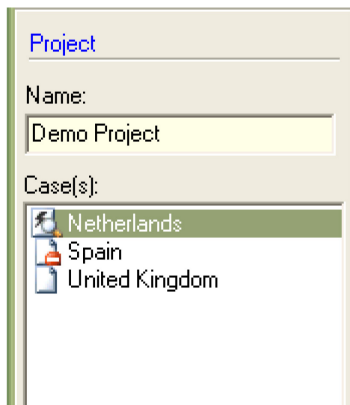
Field	Value
Name	Demo project
Owner	JV
Creation date	2010-12-14 23:39:05
Description	Demonstration project

Buttons: Cancel, OK

Figure 3
Project properties dialog.

3.3.2 Opening a project

An existing project can be opened using the Open Existing Project button  or through the main menu (Project | Open ...)



The case list on the left of the window will display a list of all cases contained in the open project file.





-  Currently selected case
-  Case with incomplete database information
-  Any other case

Figure 4

Project information pane and case selection list.

3.3.3 Editing a project

An open project is saved using the Save Current Project button  or through the menu (Project | Save) or (Project | Save as ...).

Hair will report unsaved project changes when closing.

Note that a project can only be deleted by removing the Project.xml file from disk.

3.4 Cases

In Hair, a set of choices made by the user is referred to as a 'case'. A case is defined by a selection of databases, a selection of areas, crops, compounds and a range of years for which calculations should be performed.

Double clicking a case from the case list will open the case in read-only mode.

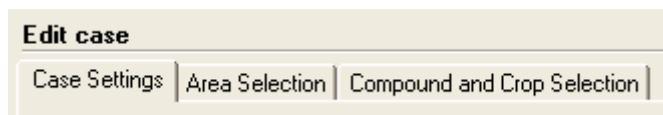


Figure 5

Pages for definition of a case.

Note that existing cases cannot be copied and only renamed, edited or deleted.

3.4.1 Case Settings

The first step in the definition of a new case is to fill out the fields in page 'Case settings'. An overview of these fields is given in Table 2.

Table 2
Fields in Case settings.

Field name	Required	Description
Name	X	Unique name for case Default: blank
Owner	-	Person who created this case Default: blank
Output folder *	X	Folder in which to place output for this case. Default: [Hair Data Folder]\output
Hair database *	X	Name and location of Hair database Default: File [Hair Data Folder]\databases*Hair*.mdb
Compound database *	X	Name and location of Hair database Default: File [Hair Data Folder]\databases*COMPOUND*.mdb
Usage database *	X	Name and location of Hair database Default: File [Hair Data Folder]\databases*USAGE*.mdb
Evaluation period	X	Year range of data to be evaluated from Usage database. Default: 2004
From		Default: 2004
Until		Default: 2004
Description		Additional description for case Default: blank

Fields marked * are automatically pre-entered to their defaults. The name of a database will be pre-entered automatically if there is just one file in the \database folder that matches the naming requirements for that type of database.

3.4.2 Area Selection

The tab "Area Selection" displays a map of Europe based on a 10 km grid. Either Country or Region (NUTS1) level is visible, depending on the "Selected scale level".

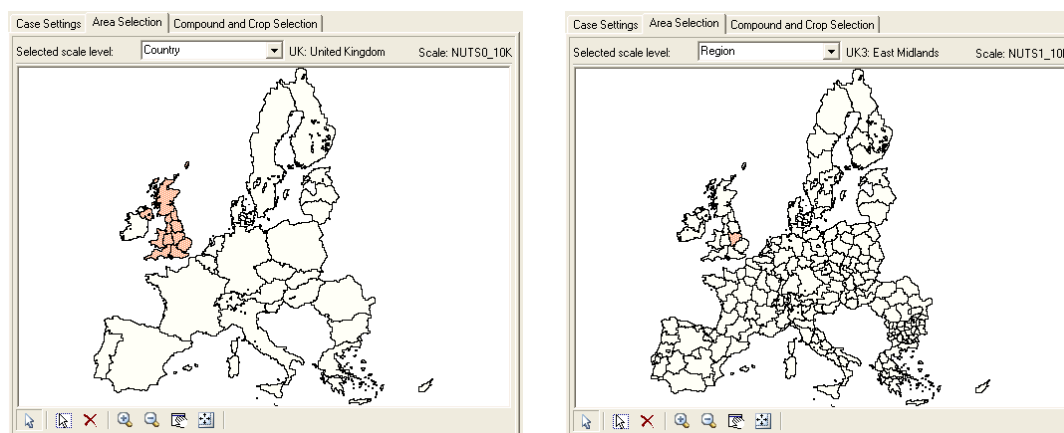









Figure 6
Map and selection at Country scale (left) and Region (NUTS1) scale (right).

The selection of countries or regions can only be changed while the case is in Edit Mode. The buttons directly below the map are used to make selections.

Hold the Ctrl-key while selecting a map unit with the mouse if more than one unit has to be added to or removed from an existing selection. A single mouse click without Ctrl-key will result in selecting only the chosen unit while deselecting all other map units.

An explanation of the function of each of the buttons below the map is given in Table 3.

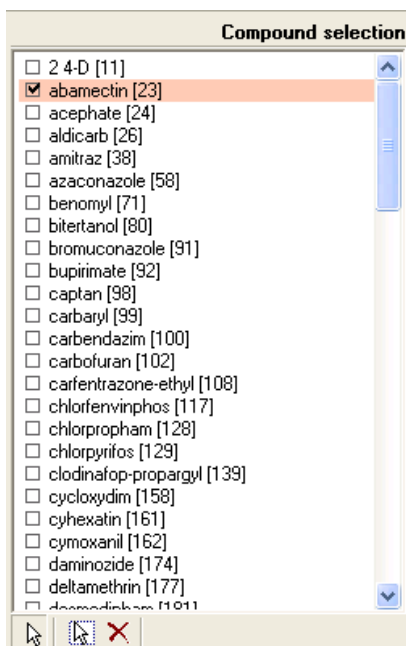
Table 3
Buttons for area selection.

	Select area	Marks the selected area or unmarks it when it is already selected
	Select all areas	Marks all areas on map
	Unselect everything	Clear selection
	Zoom in	Zooms in on click or can be used to drag a rectangle around the area to zoom into
	Zoom out	Zooms out on click
	Pan map	Drag and move the map (only when zoomed in)
	Show entire map	Zooms out to whole map

Selection of a country will result in the selection of all the underlying regions. Selection of some of the regions in a country is only possible at Region scale level.

3.4.3 Compound and Crop Selection

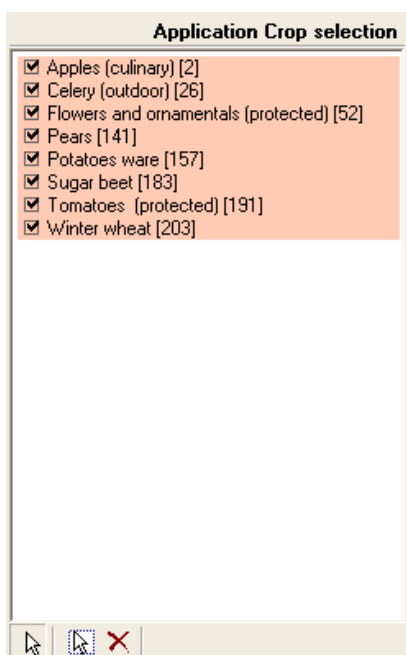
Page 'Compound and Crop Selections' consists of two lists from which the user can make a selection as shown in Figure 7 and Figure 8.



Compound selection:

This list contains the names of compounds that are found in the Usage Database (not necessarily all the compounds in the Compound Database). Compounds are listed alphabetically and their ID (as used in Compound and Usage Database) is listed behind the name in square brackets for reference.

Figure 7
Case compound selection.



Application Crop selection:


This list contains the names of *application crops* that are found in the Usage Database (not necessarily all the Application crops in the Hair Database). Application crops are listed alphabetically and their ID (as used in Hair and Usage Database) is listed behind the name in square brackets for reference.

Figure 8
Case application crop selection.

Selection of crops and compounds is done using the buttons below the two lists. The three buttons have the same meaning as those for Area selection as explained in Table 3.

Hold the Ctrl-key while selecting an item with the mouse to select more than one item or remove an item from an existing selection. A single mouse click without Ctrl-key will result in selecting only the chosen items while deselecting all other items in the list.


3.4.4 Creating a new case

Use the  button or menu (Case | New case) to create a new case. New cases are automatically created in Edit mode and can be adjusted right away. At least the information in tab 'Case settings' needs to be completed. The new case will automatically save once the minimally required case information has been entered. Saving the case will reveal two additional tabs for [Area Selection] and [Compound and Crop Selection], the information which is based on the database selection.


3.4.5 Opening an existing case

An existing case in the active project is opened by double-clicking the case name in the case selection list on the left of the main page. The case will be opened in read-only mode.


3.4.6 Editing a case

A selected case can be modified by clicking the  button from the toolbar or from below the 'Review case' view.

3.4.7 Saving a case


The case is saved using the  button or from the menu (Case | Save Case). Cases are saved to the project file.

3.4.8 Deleting a case

Cases are deleted by selecting a case in the case list and then selecting the  button from the toolbar or from the menu (Case | Delete Case).

Deletion of a case is only permanent once the project to which the case belongs is explicitly saved.

3.4.9 Evaluating a case

Selecting the  button will pop up a window summarizing the current case selection in terms of selected Year range, selected regions, compounds and crops and the resulting number of selected gridcells and applications. The selected number of gridcells and applications is a measure for the number of calculations that need to be performed.

A number of zero selected Application Records mean that the combination of selected years, areas, compounds and crops did not result in any records from the Usage database being selected.

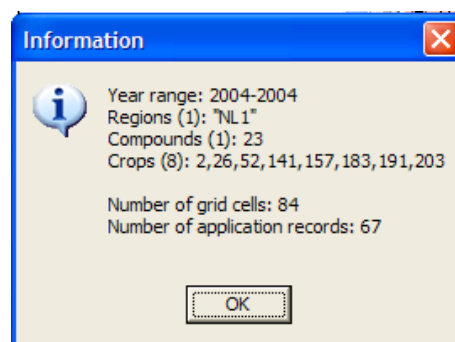



Figure 9
Case evaluation message.

3.5 Calculations






Calculations are initiated from the calculation Screen which is opened using the  button or menu (Case I, Calculation Screen). A case has to be selected to be able to view the Calculation Screen.

An information dialog will inform you of the number of gridcells and applications in your case selection.

The calculation screen consists of three pages; 1) Progress, 2) Log and 3) Messages and has a single row of buttons at the bottom of the page.

Table 4

Buttons on calculation page.

 Start	Start calculations
 Stop!	Stop current calculation
 View HAIR Output	View results of calculations
 Copy to Clipboard	Copy the Log or Message text to clipboard
 Save to File	Save the Log or Message text to text file (.txt)

3.5.1 Calculation Progress

The actual calculations are started using the [Start] button and can be interrupted any time with the [Stop] button. However, results are lost when the calculations are stopped.

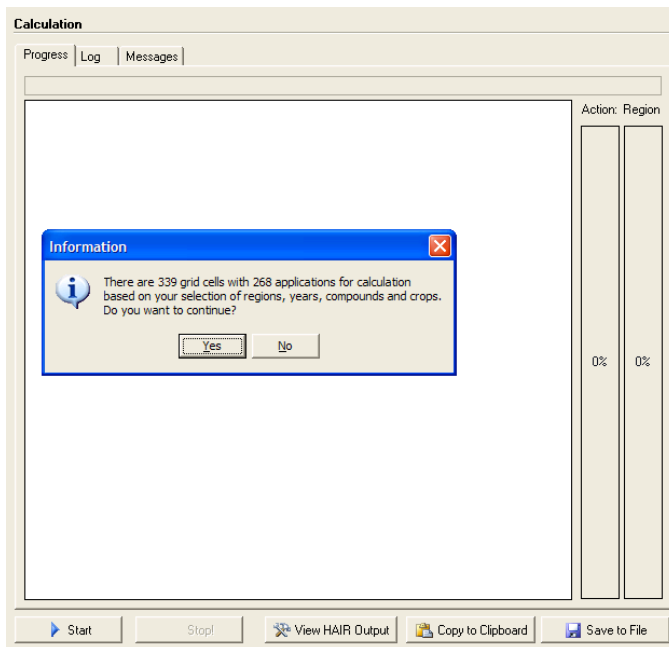


Figure 10

Case evaluation message before calculation.

Progress of the calculations can be followed from the progress text above the main progress window, the progress map and the two progress bars to the right of the map.

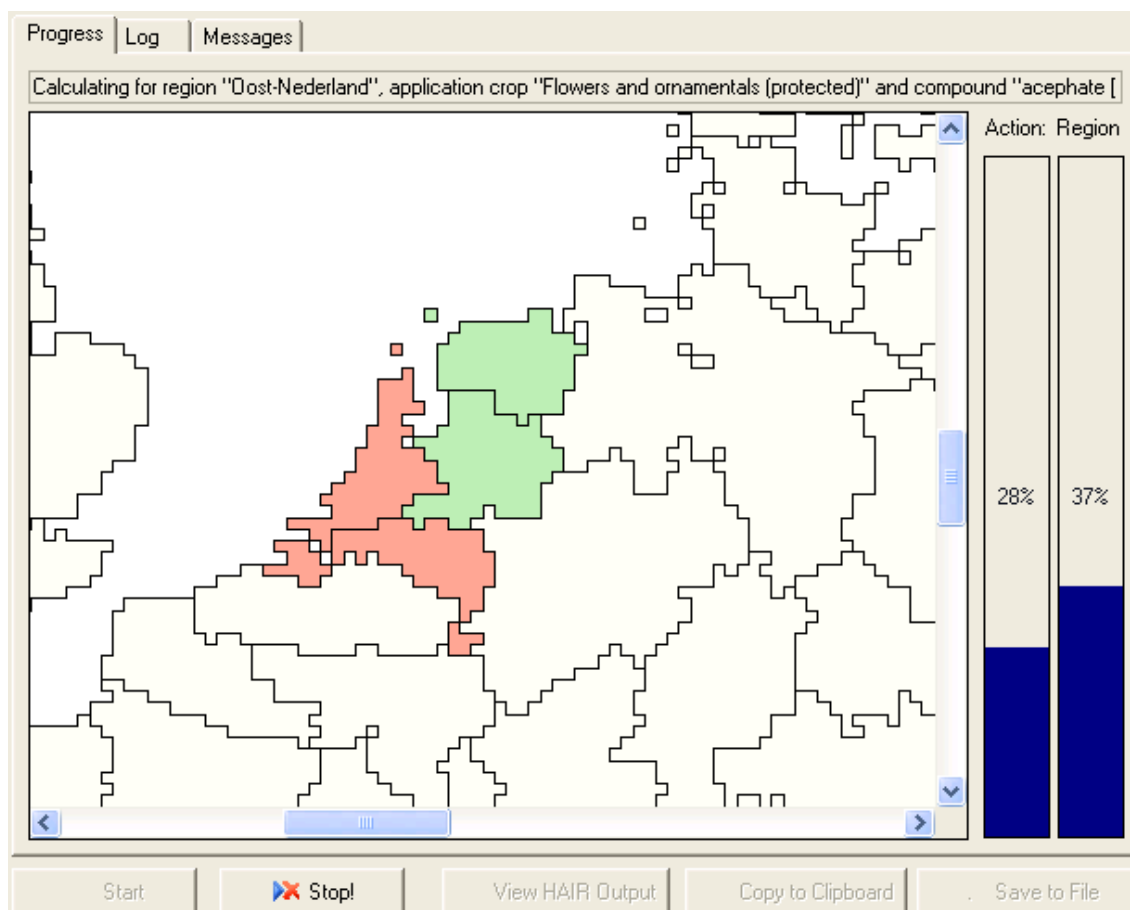


Figure 11
Calculation progress in progress text, map and progress bars.

3.5.2 Log and messages

A log page is displayed once the calculations are completed. This page contains information about the calculation job and has a section for each NUTS1 region that was analysed, see Figure 12. The Log and messages can be copied to clipboard or saved to file.

The software reports whether any issues occurred during calculation. If so, the messages will be shown on the Messages page.

Currently the following issues are being reported:

- **Rejected application records:**
 Application records that were skipped from analysis because of missing, invalid or inconsistent data. See the HAIR2010 Documentation, Section 1.5.1 for application data requirements.
 It is the responsibility of the user to provide valid application data.
- **Occupational indicators not calculated because of failed lookup:**
 Some occupational indicators depend on the lookup of additional information (e.g. POEM data, Recovery values). A message is printed if an application record -even though valid and in scope- has a combination of values that does not result in a valid lookup for the additional data.
 This issue cannot be solved directly by the user because these lookup values are stored in the HAIR database of HAIR2010.

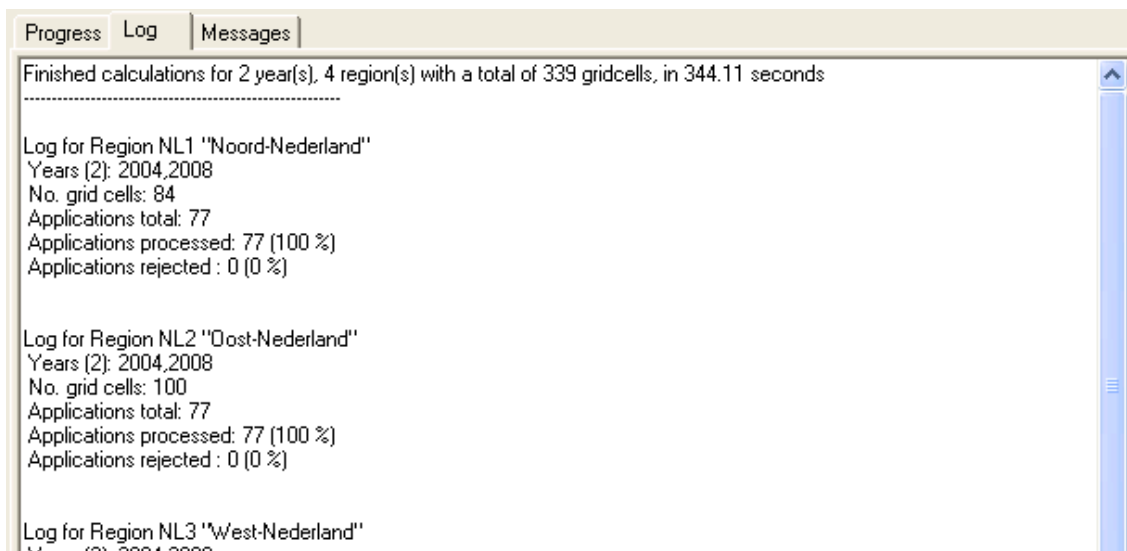


Figure 12
Log and messages after calculation.

3.5.3 Hair output files

Hair2010 writes a record with calculation results to file once the calculations have been completed for all indicators for each relevant combination of one application record and one gridcell. An output file can easily reach several thousands to a hundred thousand records, depending on the number of gridcells and the number of application records selected.

Location and naming

Output files are saved to the folder that is entered during the definition of a case under Case Settings, Output folder (see Section 3.4.1). The files are automatically named according to the following format:

<project name>_<case name>_<start year>_<end year>.csv

Format

Output is saved as a text file in comma delimited format (.csv), i.e. values are delimited by a separator character. The separator character used depends on the Windows regional settings; for English language systems that use a decimal dot (".") the separator character is usually a comma (","),. Languages that use a comma as decimal symbol might use a semicolon (";") for separator. The value of this separator character can be verified and checked under the Local settings of the Windows configuration (Windows start menu, Control panel, Region and Language, Formats page, [Additional Settings] button → **List Separator**

String values are enclosed in double quotes (" ").

The first line of the file contains the column header names, separated by the separator character. Each subsequent line is a result record and contains all indicator results, plus additional information, separated by the separator character, for one application x gridcell combination.

This kind of file can be read in any text editor and can also be opened in a spread sheet application for further analysis.

HAIR uses the same separator character as Microsoft Excel on the same PC. If Microsoft Excel does not open the csv files correctly (showing all values as a single string per record) then this is probably due to different regional settings on the PC that created the CSV file and that of the target PC that does not recognize the same separator character. Excel has a function called 'Text to columns' that correctly places the values in separate cells.

Content

The output file currently has 93 columns. Each of the 29 HAIR indicators is represented by two columns, e.g. **bees_acute_hazard** and **STATUS_bees_acute_hazard**. The first of the two columns contains the actual calculated indicator value; the second column contains a status value for the indicator calculation. The status value, as explained in Table 5, is based on how -if at all- the indicator was calculated in relation to the information from the gridcell and application for which it was calculated.

Table 5

Meaning of indicator status values.

Status value	Meaning
0	Success, original data An indicator value was calculated and based on original compound data.
1	Success, replacement based on chemical class An indicator value was calculated but <i>at least one compound property</i> was generated by the missing value routine based on the compound's chemical class
2	Success, replacement based on chemical use An indicator was value calculated but <i>at least one compound property</i> was generated by the missing value routine based on the compound's chemical use
3	Failure, missing compound data An indicator value could not be calculated because of missing compound data that could not be solved by the missing value routine. The indicator value is set to zero.
4	Failure, other unspecified An indicator value could not be calculated because of any other missing data or calculation problem which is not specified. The indicator value is set to zero.
5	Not applicable, out of scope An indicator value was not calculated because the application was out of scope for the indicator. The indicator value is set to zero.

The output file contains additional (to the 2 x 29 indicator fields) columns that identify the gridcell and application for which the calculations were performed. This includes references to the timing of the application, the compound used, the crop for which it was applied, some fields relating to mitigation and some intermediate results. Table 6 lists all non-indicator fields of the output file.

Table 6

List of non-indicator fields in Hair output file.

Column name	Description
GridCell	Unique gridcell ID
X_map	X-coordinate of gridcell
Y_map	Y-coordinate of gridcell
NUTS0	NUTS0 (country) unit in which gridcell is located
NUTS1	NUTS1 (country) unit in which gridcell is located
ApplicationID	Unique application ID
Year	Application year (not necessarily year of application date)
Month	Month of application date
DayNr	Julian day number of application date
CompoundID	Unique compound ID
Compound	Compound name
ChemicalClass	Compound chemical class
ChemicalUse	Compound chemical use
ApplicationCrop	Application crop name
HairCrop	Hair crop name (based on application crop)
ApplicationRate_kgai_ha	Application rate (kg a.i./ha)
NrOfApplicationEvents	Number of application events
ApplicationInterval_d	Application interval (days)
AreaTreatedPerGridcell_ha	Calculated area treated per 10 x 10 km gridcell (ha)
MethodOfApplication	Method of application
Formulation	Formulation of compound
BufferStripWidth	Buffer strip width (meter)
DriftMitigationFactor	Mitigation factor for drift (-)
FieldMarginWidth_m	Field margin width (meter)
FloweringWeedsInCrop	Presence of flowering weeds in crop (true/false)
WP6-TE	< separator field; start of terrestrial indicators (WP 6)>
CIF	Crop interception factor
NSDF	Net Soil Deposition factor
.. Terrestrial indicator fields	
WP7-AQ	< separator field; start of aquatic indicators (WP 7)>
Load_drift_aqua_kg	Load of compound in drift (kg)
Load_runoff_aqua_kg	Load of compound in run-off (kg)
Load_erosion_aqua_kg	Load of compound in erosion (kg)
Load_total_aqua_kg	Total load of compound in water (kg)
.. Aquatic indicator fields	
WP8-GW	< separator field; start of groundwater indicator (WP 8)>
.. Groundwater indicator fields	
WP10-OC	< separator field; start of occupational indicators (WP 10)>
.. Occupational indicators fields	

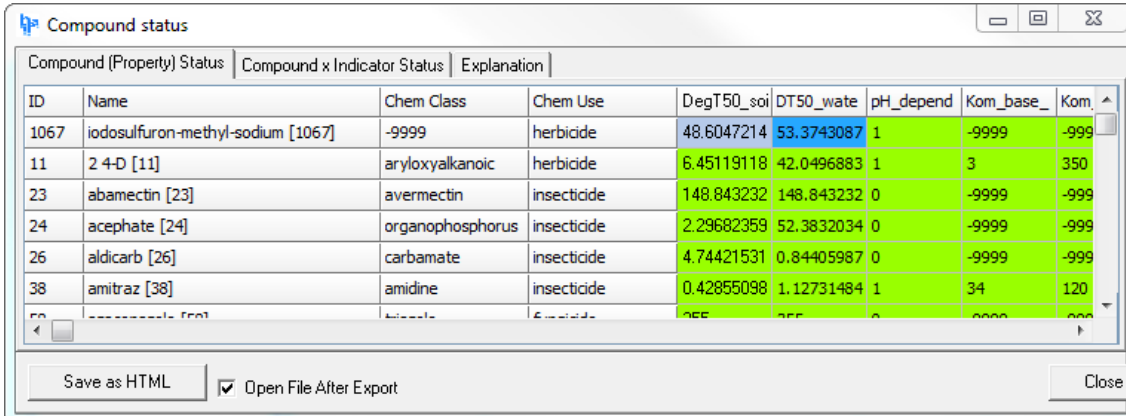
Other files in the output folder

Hair2010 produces two more files to the same folder and together with the output file.

1. *<case name>.csv*
Case description and definition in csv format.
2. *<project name>_<case name>_<start year>_<end year>.meta.txt*
Case description and definition in txt format as used by HairOutputViewer.

3.6 Compound Status

Hair2010 includes a 'Compound Status' function that provides insight into a) compound property values that were used for the calculations, and b) the indicators that can be calculated for each compound. This function is accessed through the menu (Tools | View Compound Status) and can only be accessed when a case is selected.



The screenshot shows a window titled 'Compound status' with three tabs: 'Compound (Property) Status', 'Compound x Indicator Status', and 'Explanation'. The 'Compound (Property) Status' tab is active, displaying a table with the following data:

ID	Name	Chem Class	Chem Use	DegT50_soi	DT50_wate	pH_depend	Kom_base_	Kom_
1067	iodosulfuron-methyl-sodium [1067]	-9999	herbicide	48.6047214	53.3743087	1	-9999	-999
11	2,4-D [11]	aryloxyalkanoic	herbicide	6.45119118	42.0496883	1	3	350
23	abamectin [23]	avermectin	insecticide	148.843232	148.843232	0	-9999	-999
24	acephate [24]	organophosphorus	insecticide	2.29682359	52.3832034	0	-9999	-999
26	aldicarb [26]	carbamate	insecticide	4.74421531	0.84405987	0	-9999	-999
38	amitraz [38]	amidine	insecticide	0.42855098	1.12731484	1	34	120

At the bottom of the window, there are buttons for 'Save as HTML', a checked checkbox for 'Open File After Export', and a 'Close' button.

Figure 13
Compound Status, page Compound (Property) Status.

The Compound Status form contains three pages and is opened at the Compound (Property) Status page. An explanation of the functionality and legend is provided on the third page, 'Explanation'.

3.6.1 Compound (Property) Status page

The Compound (Property) Status table, as shown in Figure 13, lists the compounds present in the selected Usage Database and the values replaced by the missing values routine for compound properties.

The columns and cells of the table represent the properties and property values of the compound. The cell colours are related to the indicator status values 0, 1, 2 and 3 as explained in Table 5. The value -9999 represents undefined and missing values (after application of the missing value routine).

3.6.2 Compound x Indicator Status page

The Compound x Indicator Status table lists the compounds presented in the selected Usage Database. The columns of the table represent the HAIR indicators. The cell colours and value are related to the indicator status values 0, 1, 2 and 3 as explained in Table 5.

Compound (Property) Status | Compound x Indicator Status | Explanation

EARTHWORMS_ACUTE - "abamectin [23]"
Kom_L_kg (2). LC50_earthworm_mgai_kgdw (2)

ID	Name	Terrestrial	Terrestrial	Terrestrial	Terrestrial	Terrestrial	Terrestrial	Terrestrial	Aquatic
		bees_acute	earthworms	earthworms	birds_rwc_a	birds_rwc_c	mammals_r	mammals_r	algae_acut
1067	iodosulfuron-methyl-sodium [1067]	0	2	2	0	0	2	0	2
11	2 4-D [11]	0	0	0	0	0	0	0	0
23	abamectin [23]	0	2	2	2	2	2	2	2
24	acephate [24]	1	0	1	0	0	0	0	0
26	aldicarb [26]	0	0	0	0	0	1	0	0
38	amitraz [38]	0	0	0	0	0	2	0	0
58	azaconazole [58]	1	1	1	1	0	0	0	1
71	benomyl [71]	0	0	0	0	0	1	0	0
80	bitertanol [80]	0	0	0	0	0	0	0	0

Save as HTML Open File After Export Close

Figure 14
Compound x Indicator Status page.

A single click on a coloured cell will show the indicator name, the compound and the “problem” properties (with status value between brackets) in the area above the table as is show in Figure 14.

4 Hair Output Viewer

4.1 Introduction



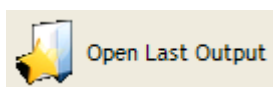
The HairOutputViewer provides quick access to the results from the Hair calculations which are stored as comma separated file (.csv). It allows the user to browse a table with results, create summary reports for each compound in the data set and export the information to the HairStudio tool for more detailed visualization of the data.

HairOutputViewer is started either from within Hair2010 - using the menu (Tools | View Hair Output) or the [View Hair Output] button at the bottom of the calculation page- or separately from the short cut in the Windows Start Menu.

4.2 Viewing HAIR output

4.2.1 Loading Hair output files

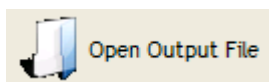
Initially, HairOutputViewer will display an empty window with the message 'no data to display'. The user has two options to load and display a Hair output file:



Open Last Output

Menu: File | Open Last Output

This will open the most recent Hair output file.



Open Output File

Menu: File | Open Output File

This will show a File Open dialog for the user to select any previously created Hair Output File (*.csv) for display.

Opening an output file might take a while, depending on the number of records.

After opening, HairOutputViewer will show the data contained in the output file as well as the meta information relating to this file. The meta information includes;

- CSV file name, creation data and size
- Number of records and columns contained
- Databases on which the case was based.
- Year range, area, compound and crop selection on which the case was based.

The meta information can be hidden using the [Hide Meta Information] button

The contents of the output table are identical to those of the Hair output File. A single record in the table contains the output for a combination of an application and a gridcell and has a fixed number of columns.

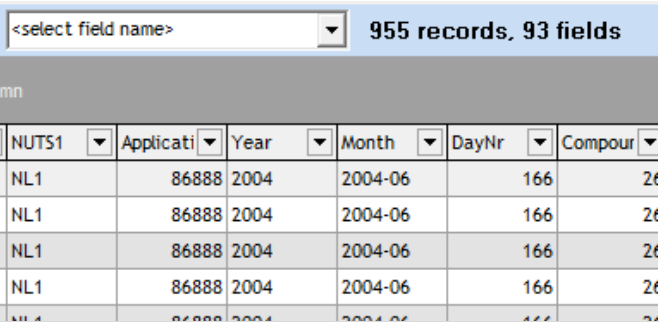
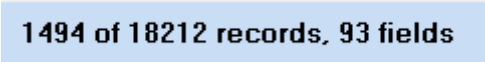
GridCell	X_map	Y_map	NUTSO	NUTS1	Applicati	Year	Month	DayNr	Compour	Compound
74909	4065000	3335000	NL	NL1	86888	2004	2004-06	166	26	aldicarb
75360	4075000	3345000	NL	NL1	86888	2004	2004-06	166	26	aldicarb
74458	4055000	3325000	NL	NL1	86888	2004	2004-06	166	26	aldicarb
74459	4055000	3335000	NL	NL1	86888	2004	2004-06	166	26	aldicarb
74460	4055000	3345000	NL	NL1	86888	2004	2004-06	166	26	aldicarb
74461	4055000	3355000	NL	NL1	86888	2004	2004-06	166	26	aldicarb
74462	4055000	3365000	NL	NL1	86888	2004	2004-06	166	26	aldicarb
74905	4065000	3295000	NL	NL1	86888	2004	2004-06	166	26	aldicarb
74906	4065000	3305000	NL	NL1	86888	2004	2004-06	166	26	aldicarb
74908	4065000	3325000	NL	NL1	86888	2004	2004-06	166	26	aldicarb


Figure 15
HairOutputViewer displaying an output file.

4.2.2 Browsing an output table

The Hair output tables contain more than 90 columns and will usually contain thousands of records. HairOutputViewer provides a number of options, as listed in Table 7, to easily navigate through the vast table data. Note that browsing the table becomes slower with the number of records in the table.

Table 7
Functions for browsing output tables.

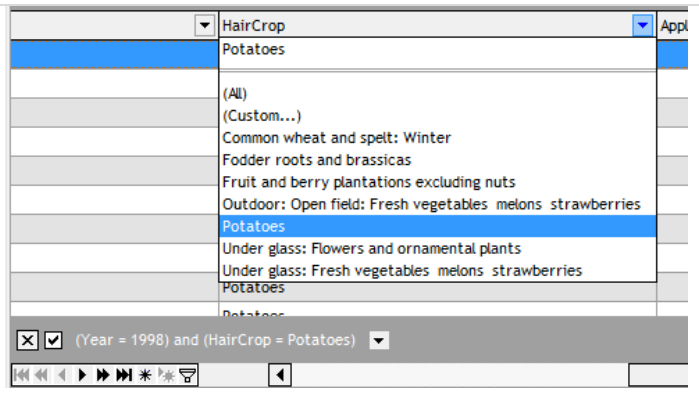
Function	Example
<p>Jump to field</p> <p>Select a Hair variable /indicator name from the 'Jump to field' list and the table will jump to that column.</p>	
<p>Filter on column</p> <p>Click on the downwards pointed arrow at the right side of the column name <input type="checkbox"/> to open a list of items on which to filter.</p>	

The same arrow will turn blue when a filter is active 

Multiple columns can be filtered simultaneously.


Any active filter is displayed in the grey band directly below the table and can be removed from there.

The 'Custom...' option will start a filter builder with which more complicated filter conditions can be constructed,



Sort on column






A single click on the column header/name will sort the selected column in one direction. Another click will sort in the opposite direction. The sorting direction (ascending, descending) is indicated by the small grey arrow left from the filter button. A sort on multiple columns is achieved by holding the [Shift] button while clicking on the second and following column headers

ApplicationI 
83241
83607
83644
83645
83646
83647
83648

Grouping on column

Data can be grouped on one or more columns by dragging the column header to the grey area directly above the column names.

This will initially collapse all related records into a single line which will unfold when the [+] sign on the left side is clicked.

Year 	GridCell 	ApplicationI 	X_ma 	Y_map 	NUTS
+ Year : 1998					
+ Year : 2004					
- Year : 2008					
	72213	89090	4005000	3375000	NL
	72657	89001	4015000	3315000	NL
	72657	89003	4015000	3315000	NL
	72657	89004	4015000	3315000	NL
	72657	89005	4015000	3315000	NL

Navigator

A table navigator is located directly left below the table. It contains buttons for (left to right):

- Got to first record
- Go one page up
- Go to previous record
- Go to next record
- Go one page up
- Go to last record
- Bookmark a record
- Go back to bookmarked record
- Start the custom filter builder



4.3 Connecting to HairStudio

The option “Start HairStudio” (menu Tools | Start HairStudio) has two functions. Firstly it will ask the user whether the currently loaded output file should be copied into the HairStudio database and thus make the data available to the HairStudio software. Secondly it will start the HairStudio software.

Note that HairStudio will display information from a previous output file when it is started *without* copying the visible data.

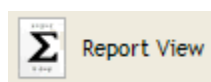
HairOutputViewer will automatically close any open HairStudio windows when copying new data into the HairStudio database.

4.4 Hair reports

4.4.1 Creating a report

HairOutputViewer has functionality to create a summary report of the information contained in the output file.

A report summarizes the cumulative indicator values between the start year and the end year (as in the case definition) for a single compound.



The user has to select and load an output file before being able to produce a report. The reports are accessed using the [Report View] button or the menu (View | Report View).

Selecting a compound from the “Report for compound” list will immediately display the requested report.

The report consists of a meta information part that lists the compound for which the report is compiled and the relevant case information.

The lower part of the report has a line for each indicator containing the following fields:

- Indicator : Name of indicator.
- Status : Maximum status value for that compound x indicator (where the status is less than three).
- Start year: Cumulative value of the indicator for the selected compound in the start year.
- End year : Cumulative value of the indicator for the selected compound in the end year.
- Reduction: Difference between end year and start year.
- Reduction %: $100 * (\text{value start year} - \text{value end year}) / \text{value start year}$.

It is possible that the start year and/or end year columns contain the value zero. This is because the case definition did not result in any valid calculations for the selected compound for that particular year.

Report for Compound: <input type="text" value="amitraz"/>						
		<input type="button" value="Save Report"/>		<input type="button" value="Save Report for All Compounds"/>		<input type="checkbox"/> Open file after
amitraz						
Hair Report						
Hair version		HAIR [Version: 2010.0.5 - 1]				
Project		Beta				
Case		test NL				
Hair database		dbHAIR_v4.mdb	in: M:\Dev\HA			
Use database		dbUSAGE_NL_v1_5.mdb	in: M:\Dev\HA			
Compound database		dbCOMPOUND_v3.mdb	in: M:\Dev\HA			
Compound ID and name		[38] amitraz				
Evaluation period		1998 - 2008				
Total area treated (ha) - Start year		8.76E+002				
Total area treated (ha) - End year		4.37E-001				
Indicator	Status	Start year	End year	Reduction	Reduction %	
Aquatic Indicators						
1) algae_acute_standing	2	2.98E+001	1.06E+000	2.88E+001	96	
2) daphnia_acute_standing	2	9.72E+001	3.46E+000	9.37E+001	96	
3) fish_acute_standing	2	5.18E+000	1.85E-001	5.00E+000	96	
4) algae_chronic_standing	2	2.00E+001	8.78E-001	1.92E+001	96	
5) daphnia_chronic_standing	2	1.91E+001	6.00E-001	1.85E+001	97	
6) fish_chronic_standing	2	4.28E+001	1.34E+000	4.15E+001	97	
7) algae_acute_flowring	2	2.81E+001	1.06E+000	2.70E+001	96	
8) daphnia_acute_flowring	2	9.16E+001	3.46E+000	8.81E+001	96	
9) fish_acute_flowring	2	4.88E+000	1.85E-001	4.70E+000	96	
10) algae_chronic_flowring	2	9.27E+000	3.51E-001	8.92E+000	96	
11) daphnia_chronic_flowring	2	1.41E+000	3.14E-002	1.38E+000	98	
12) fish_chronic_flowring	2	3.15E+000	7.02E-002	3.08E+000	98	

Figure 16
Example of HAIR report.

4.4.2 Exporting reports

The visible report can be saved to MS Excel format using the [Save Report] function. The [Save Report for All Compounds] will create a MS Excel file that contains one report sheet per compound.

4.5 Other functionality

Open CSV file

The “Open CSV File in Associated Application” function is started from the menu (Tools | Open CSV File in Associated Application) and will load the selected csv file into the application that is linked to the csv file format on the user’s PC. Depending on the configuration of the user’s PC this will usually result in MS Excel opening the CSV file. If MS Excel is not installed or not linked to csv files then the file will usually be opened in a text editor.

Open CSV folder

The “Open CSV Folder” function is started from the menu (Tools | Open CSV Folder) and will open the Windows File Explorer on the folder where the currently selected output file is stored.

5 HairStudio

5.1 Introduction

HairStudio is a presentation tool for Hair output data that can produce the following types of visualizations:

- Maps
- Tables
- Cumulative (distribution) graphs
- Pie charts
- Time series graphs

HairStudio can only represent information for one country and one indicator at a time. The presentations are always based on an aggregation of the underlying data but the user can define a number of 'break-down' levels by which the results in the presentations are dis-aggregated.

HairStudio reads its data from the HairStudio database which is filled with data from Hair output files by the HairOutputViewer (see Chapter 4.3). The default location of the HairStudio database is in the Hair data folder which, by default, is located in <HAIR data folder>\hairstudio\HairStudio.mdb.

5.2 Navigation

HairStudio consists of four pages through which the user has to cycle in order to (re-)define and create a presentation of the Hair data. The user can move forward and backward through these pages using the [Back] (Page Up) and [Next] (Page Down) buttons.

Version information for the HairStudio database is displayed at the bottom of the page between the navigation buttons.



Figure 17
HairStudio splash screen.

5.2.1 Main page

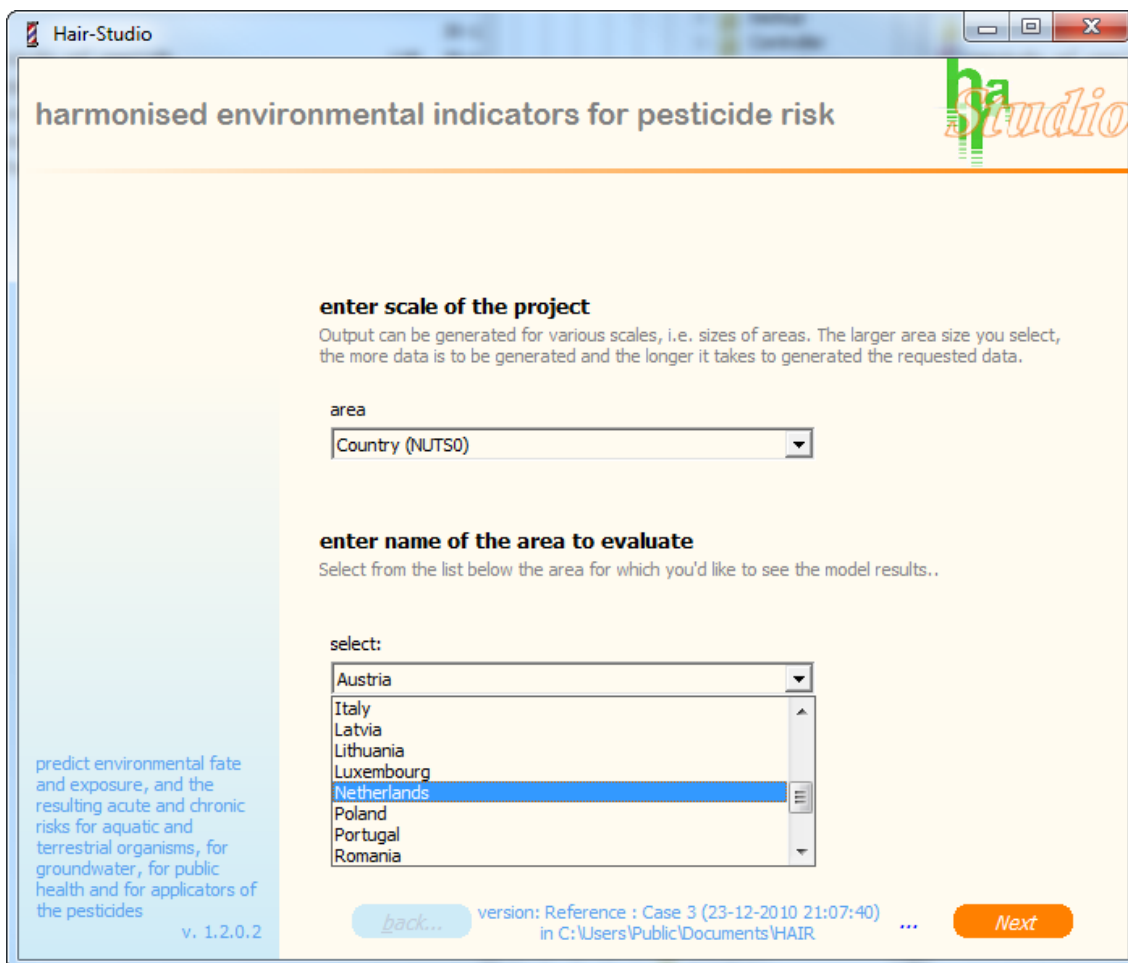
The main page of HairStudio (Figure 18) is loaded with the results that were last exported to the HairStudio database. The user can select the resolution of the area on the main page and can select either a whole country (NUTS0) or a region within a country (NUTS1).

Enter scale of project

Selection of the scale level to select from. This is either 'Country (NUTS0)' or 'Region (NUTS1)'

Enter name of area to evaluate

Selection of the area (map) unit for which to visualize the information.



The screenshot shows the main interface of the HairStudio application. The title bar reads 'Hair-Studio'. The main heading is 'harmonised environmental indicators for pesticide risk' with the 'haStudio' logo to the right. The interface is divided into two main sections:

- enter scale of the project**: A sub-heading followed by the text 'Output can be generated for various scales, i.e. sizes of areas. The larger area size you select, the more data is to be generated and the longer it takes to generated the requested data.' Below this is a dropdown menu labeled 'area' with 'Country (NUTS0)' selected.
- enter name of the area to evaluate**: A sub-heading followed by the text 'Select from the list below the area for which you'd like to see the model results..'. Below this is a list box labeled 'select:' containing the following countries: Austria, Italy, Latvia, Lithuania, Luxembourg, Netherlands (highlighted in blue), Poland, Portugal, and Romania.

At the bottom left, there is a vertical blue sidebar with the text: 'predict environmental fate and exposure, and the resulting acute and chronic risks for aquatic and terrestrial organisms, for groundwater, for public health and for applicators of the pesticides' and 'v. 1.2.0.2'. At the bottom center, there is a 'back...' button, a version string 'version: Reference : Case 3 (23-12-2010 21:07:40) in C:\Users\Public\Documents\HAIR', and a 'Next' button.

Figure 18
HairStudio main page with scale level and area selection.

5.2.2 Indicator/representation selection page

Select the indicator you'd like to investigate

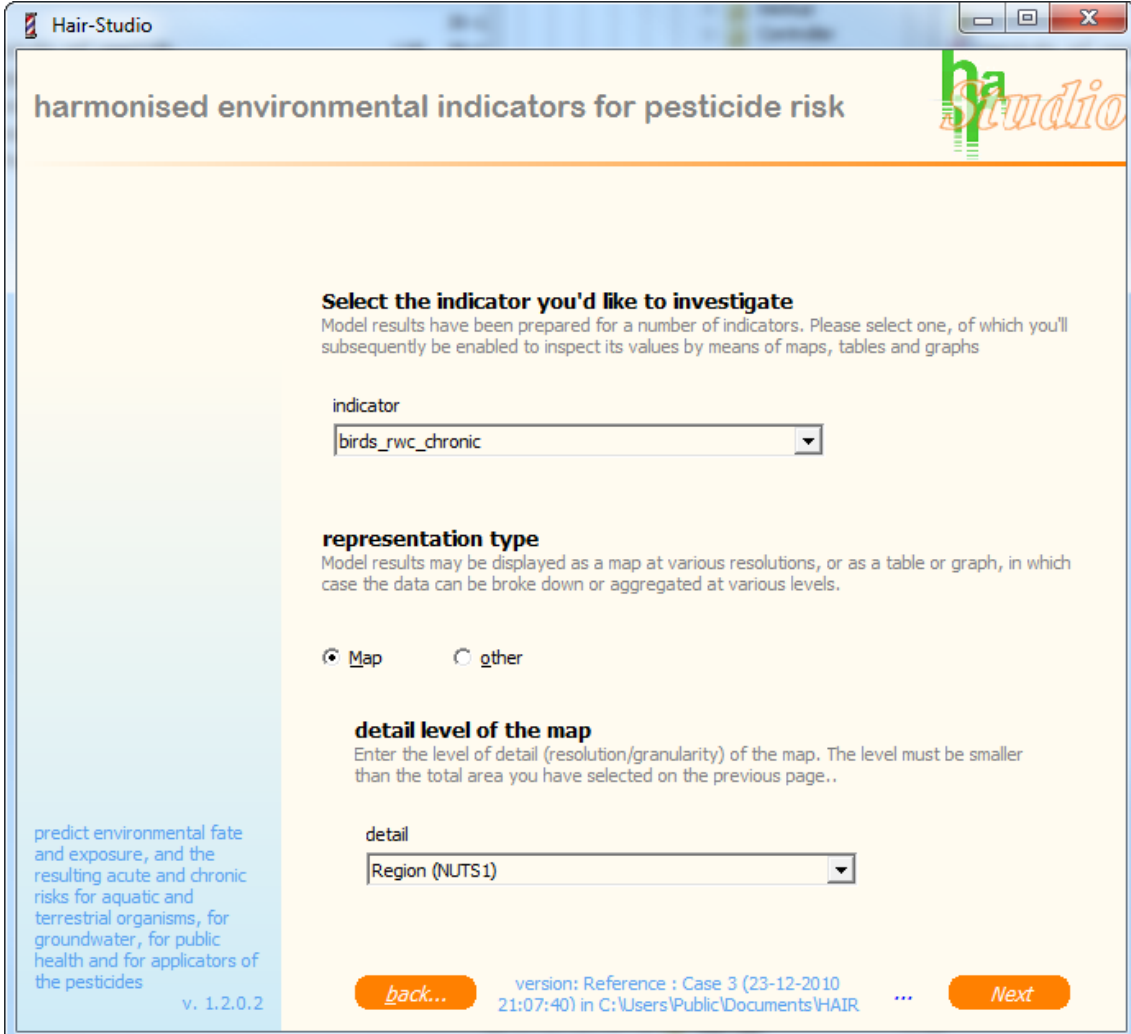
Selection of the indicator for which to create a presentation from the list of 29 Hair indicators.

Representation type

Map: Prepare a map presentation of the results.

An additional field **detail level of map** will list the detail level of the map. These scale levels can only be sub-levels of the level selected on the home page.

Other: Prepare a table or graph presentation of the results.



The screenshot shows the 'Hair-Studio' application window. The title bar reads 'Hair-Studio'. The main content area has a header 'harmonised environmental indicators for pesticide risk' and the 'ha Studio' logo. Below the header, there is a section titled 'Select the indicator you'd like to investigate' with a subtext: 'Model results have been prepared for a number of indicators. Please select one, of which you'll subsequently be enabled to inspect its values by means of maps, tables and graphs'. A dropdown menu labeled 'indicator' is set to 'birds_rwc_chronic'. Below this is a section titled 'representation type' with a subtext: 'Model results may be displayed as a map at various resolutions, or as a table or graph, in which case the data can be broke down or aggregated at various levels.' There are two radio buttons: 'Map' (selected) and 'other'. Below that is a section titled 'detail level of the map' with a subtext: 'Enter the level of detail (resolution/granularity) of the map. The level must be smaller than the total area you have selected on the previous page..'. A dropdown menu labeled 'detail' is set to 'Region (NUTS1)'. At the bottom left, there is a blue sidebar with text: 'predict environmental fate and exposure, and the resulting acute and chronic risks for aquatic and terrestrial organisms, for groundwater, for public health and for applicators of the pesticides' and 'v. 1.2.0.2'. At the bottom center, there is a version string: 'version: Reference : Case 3 (23-12-2010 21:07:40) in C:\Users\Public\Documents\HAIR'. At the bottom right, there are two orange buttons: 'back...' and 'Next'.

Figure 19

HairStudio Indicator/representation selection page.

5.2.3 Break-down options page

break-down options
By default, output values are aggregated to a general mean. Here you can select the categories and levels by which more detailed views on the data will be generated.

Compound

- none (lump all together)
- chemical use
- chemical class
- single compound

Crop

- none (lump all together)
- crop

Time

- none (lump all together)
- one year
- one month

Figure 20
HairStudio break-down options page.

By default, output values are aggregated to a general mean. On this page the user can select the categories by which to dis-aggregate the results in the presentation.

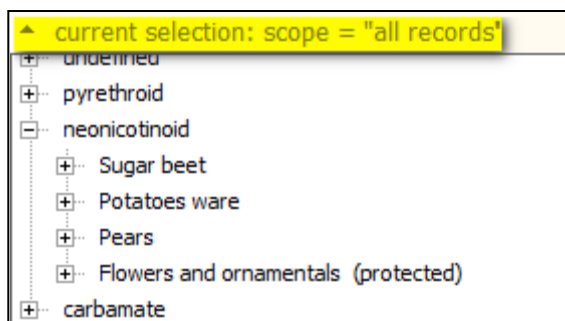


Figure 21
Break-down options below map, cumulative and time series.

Breakdown options will be directly visible only in the Table and Pie presentations. The other presentation types (map, cumulative and time series) will initially show the lumped results (i.e. as if no break down option was selected).

The effect of breaking down the information becomes visible when clicking on the arrow to the left of the selection scope area (the 'current selection : scope = all records' text below the map or graph). Here, the user can select the items of the selected break-down options from low detail (lumped) to high detail (dis-aggregated). This is illustrated in Figure 22 versus Figure 23.

The presentation will automatically update according to the selected break-down item.

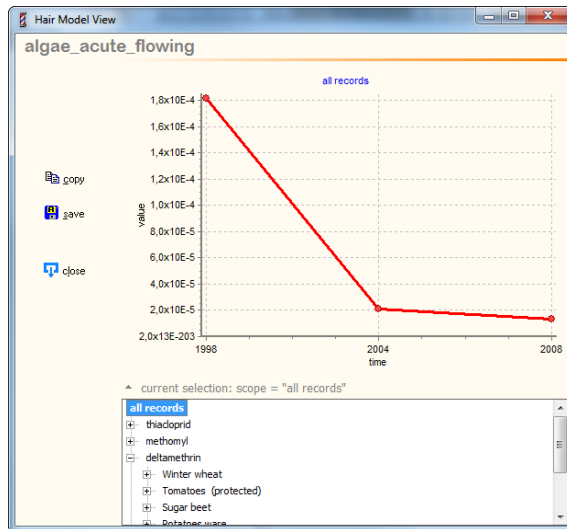


Figure 22
Time series lumped.

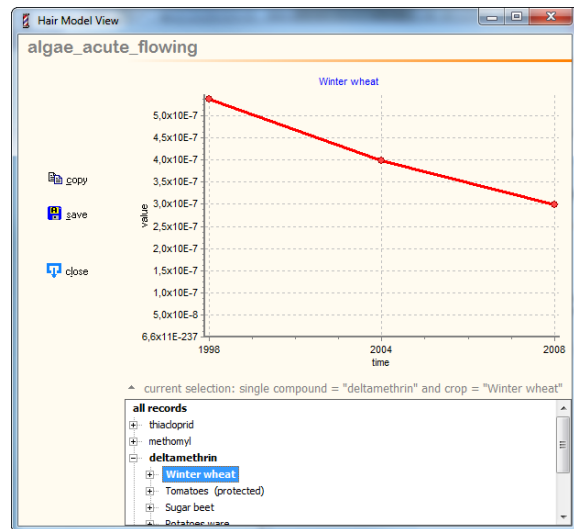


Figure 23
Time series disaggregated.

5.2.4 Visualization page

The final selection of visualization type is made on this page. When 'Map' was selected on the Indicator/Representation page then 'Map' will be the only option here. Otherwise Table, Cumulative, Pie and Time series can be selected.

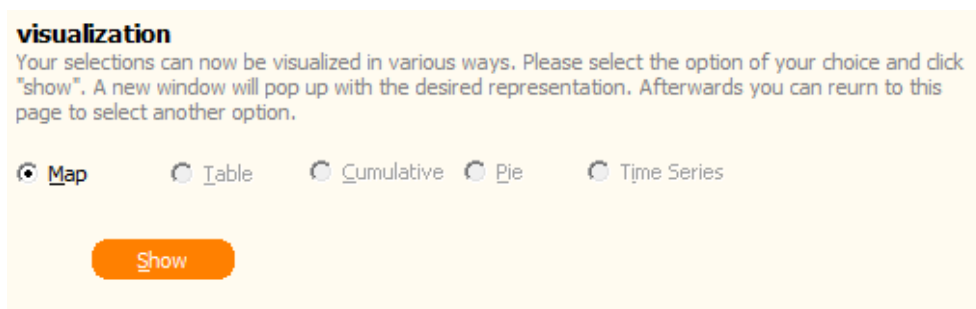


Figure 24
HairStudio visualization page.

The selected presentation is generated after clicking the [Show] button (Alt-S). Each presentation will be presented in a separate window. It is thus possible to have several presentation windows open at the same time for different combinations of indicators, presentation types and break-down options.

5.3 Presentation types

5.3.1 Map

The map presentation shows a map of the selected country or NUTS1 region by NUTS1 region or 10km gridcell. Initially, break down options will not be visible but these can be shown by changing the selection scope.

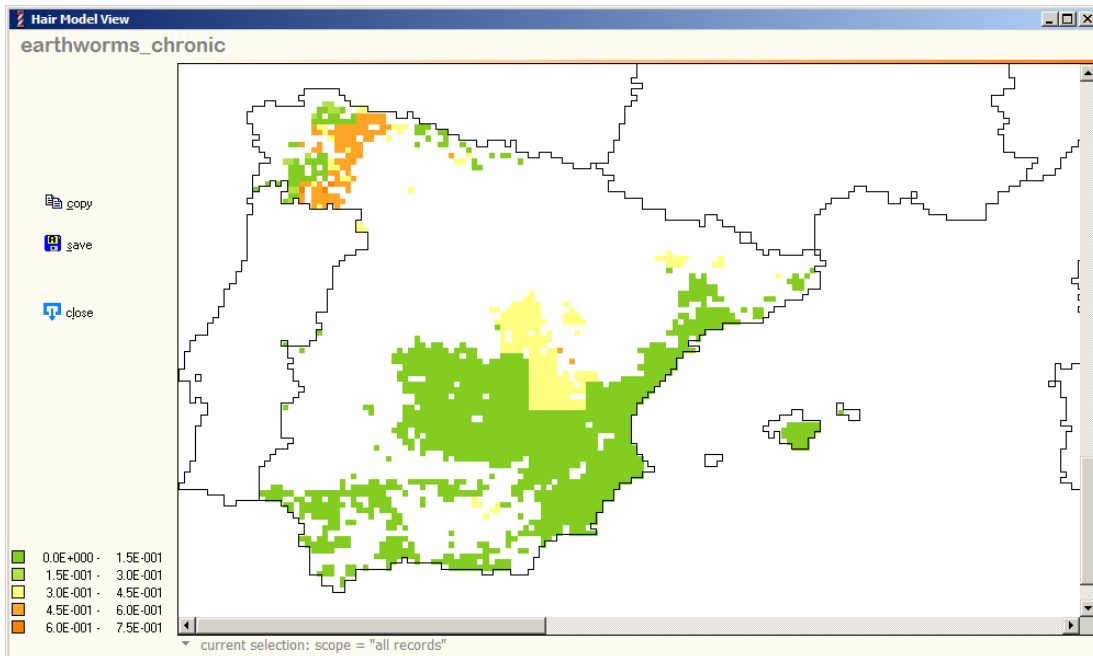


Figure 25
Map for country Spain with detail level 10 km grid.

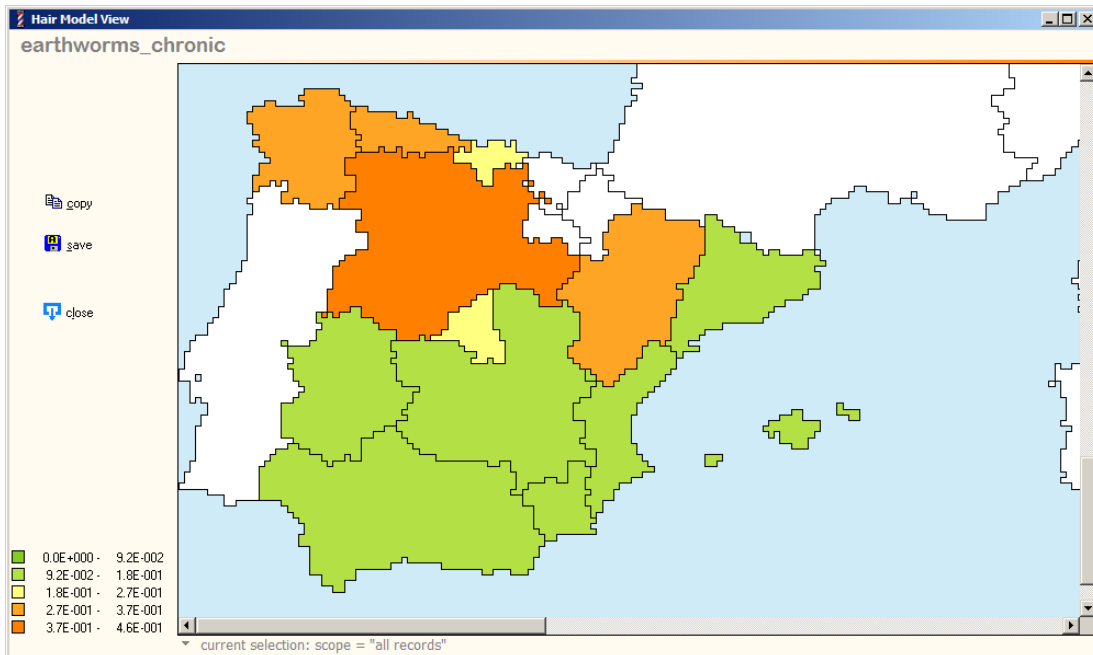


Figure 26
Map for country Spain with detail level NUTS1 region.

Indicator/Representation page:

Select option "Map". Select "the detail level of map" on the same page. The options are either "Region (NUTS1)", which will calculate one value per region, or "10km grid" which will show a value for each 10km gridcell. Click [Next] (Page Down).

Visualization page

Select option "Map" and next button [Show] (Alt-S).

Map Legend

The Map legend is constructed by dividing the difference between the maximum and the minimum value for the indicator in five *equal distance* classes.

Saving Maps

The [Copy] button will copy the image to the clipboard for pasting in e.g. MS Word.

Maps can be saved to file as image (*.bmp) and in comma separated format (*.csv) using the [Save] button.

5.3.2 Table

Tabulated summary of the selected data listing the mean value for an indicator, the number of observations (n) and the distribution statistics.

Break-down option categories are presented as additional columns at the start of the table and more (or more specific) break-down options result in bigger tables showing more detail.

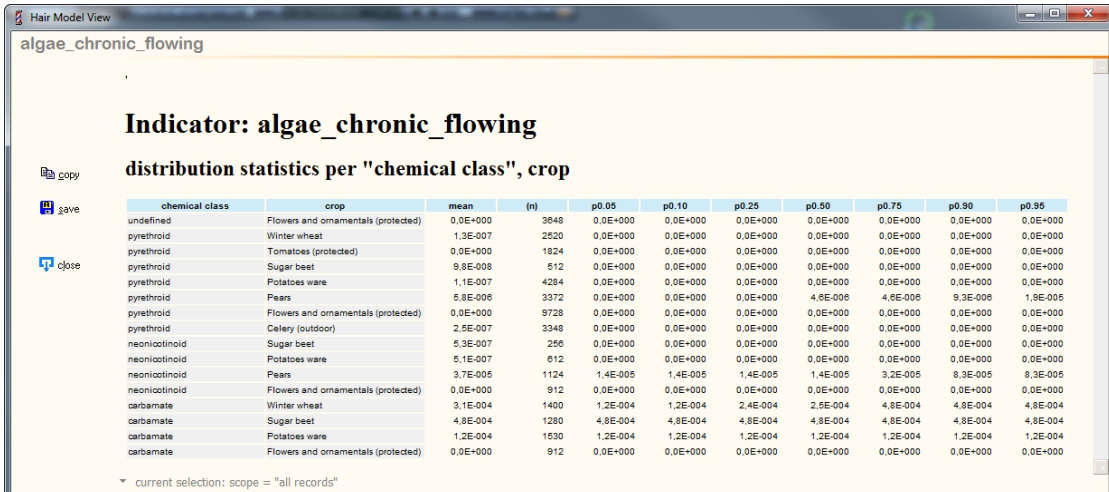
The table shows percentiles for a single indicator and is based on the number of records. Please note that extremely skewed (< 5% of records having a value > 0) distributions might result in a positive mean value but all percentiles having a value of zero.

Indicator/Representation page:

Select option "Other" and click [Next] (Page Down)

Visualization page

Select option "Table" (Alt-T) and next button [Show] (Alt-S)



The screenshot shows a window titled "Hair Model View" with a sub-header "algae_chronic_flowing". The main content is titled "Indicator: algae_chronic_flowing" and "distribution statistics per 'chemical class', crop". The table below lists various chemical classes and crops with their corresponding mean values, number of observations (n), and percentiles (p0.05 to p0.95). The table is currently filtered to show "all records".

chemical class	crop	mean	(n)	p0.05	p0.10	p0.25	p0.50	p0.75	p0.90	p0.95
undefined	Flowers and ornamentals (protected)	0.0E+000	3648	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000
pyrethroid	Winter wheat	1.3E-007	2520	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000
pyrethroid	Tomatoes (protected)	0.0E+000	1824	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000
pyrethroid	Sugar beet	9.8E-008	512	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000
pyrethroid	Potatoes ware	1.1E-007	4284	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000
pyrethroid	Pears	5.8E-008	3372	0.0E+000	0.0E+000	0.0E+000	4.6E-008	4.6E-008	9.3E-008	1.9E-005
pyrethroid	Flowers and ornamentals (protected)	0.0E+000	9728	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000
pyrethroid	Celery (outdoor)	2.5E-007	3348	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000
neonicotinoid	Sugar beet	5.3E-007	296	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000
neonicotinoid	Potatoes ware	5.1E-007	612	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000
neonicotinoid	Pears	3.7E-005	1124	1.4E-005	1.4E-005	1.4E-005	1.4E-005	3.2E-005	8.3E-005	8.3E-005
neonicotinoid	Flowers and ornamentals (protected)	0.0E+000	912	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000
carbamate	Winter wheat	3.1E-004	1400	1.2E-004	1.2E-004	2.4E-004	2.5E-004	4.8E-004	4.8E-004	4.8E-004
carbamate	Sugar beet	4.9E-004	1260	4.9E-004	4.9E-004	4.9E-004	4.9E-004	4.9E-004	4.9E-004	4.9E-004
carbamate	Potatoes ware	1.2E-004	1630	1.2E-004	1.2E-004	1.2E-004	1.2E-004	1.2E-004	1.2E-004	1.2E-004
carbamate	Flowers and ornamentals (protected)	0.0E+000	912	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000	0.0E+000

Figure 27

Table with break-down options chemical class and crop.

Saving Tables

The [Copy] button will copy the Tab separated values of the table to the clipboard. These can be pasted directly into e.g. MS Excel.

Tables can be saved to file as HTML (.html) which will maintain the table format and layout. Alternatively comma separated format (.csv) and text format (.txt) can be used.

5.3.3 Cumulative/frequency graph

The Cumulative/frequency graph shows the frequencies based on a single indicator selected. The number of records in the output file represents 100%.

Indicator/Representation page:

Select option "Other" and click [Next] (Page Down)

Visualization page

Select option "Cumulative" (Alt-C) and next button [Show] (Alt-S)

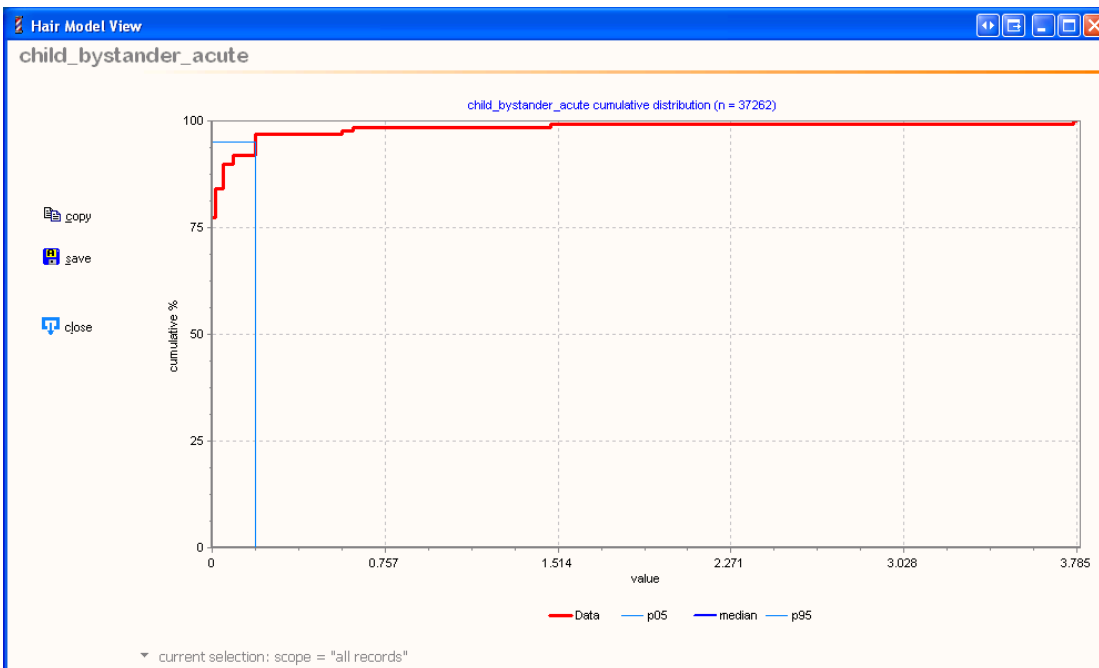


Figure 28
Cumulative graph.

Saving cumulative graphs

The [Copy] button will copy the image to the clipboard for pasting in e.g. MS Word.

Graphs can be saved to file as image (*.bmp) and in comma separated format (*.csv) using the [Save] button.

5.3.4 Pie chart

The pie chart shows the frequencies based on a single indicator selected. The total number of records in the output file represents 100%. The pie chart shows the relative frequency per combined break-down category. The percentage per slice of the pie is calculated as:
(record count (N) for a combination of break-down categories)/(total number of records)

Indicator/Representation page:

Select option "Other" and click [Next] (Page Down)

Visualization page

Select option "Pie" (Alt-P) and next button [Show] (Alt-S)

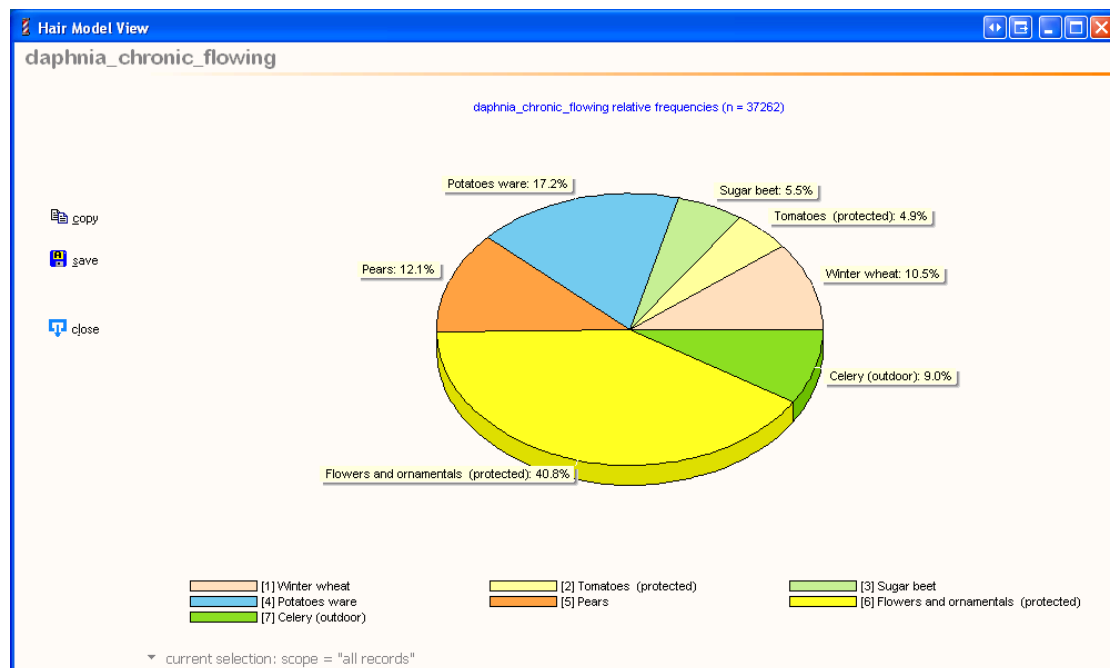


Figure 29
Pie chart with break-down option crop.

Saving pie charts

The [Copy] button will copy the image to the clipboard for pasting in e.g. MS Word. Graphs can be saved to file as image (*.bmp) and in comma separated format (*.csv) using the [Save] button.

5.3.5 Time Series

Indicator/Representation page:

Select option "Other" and click [Next] (Page Down)

Break-Down options page

The time series graph requires the selection of either "one year" or "one month" from the Time break-down group. Time Series visualization will not be available on the Visualization page if the selected time option is none.

Any additional break-down options will only be represented in the graph when the 'current selection: scope' option below the graph is used.

Visualization page

Select option "Time Series" (Alt-I) and next button [Show] (Alt-S)



Figure 30

Time series graph with 'one year' break-down option.

Saving time series graphs

The [Copy] button will copy the image to the clipboard for pasting in e.g. MS Word.

Graphs can be saved to file as image (*.bmp) and in comma separated format (*.csv) using the [Save] button.

5.4 Other functionality

5.4.1 Opening another HairStudio database

HairStudio will normally take its data from a single MS Access database named Hairstudio.mdb which is found in the Hair data folder. The default location for this database file is <shared documents>\HAIR2010\hairstudio\HairStudio.mdb.

The actual Hair output data in this database is replaced every time the user exports the information from the HairOutputViewer to the HairStudio database.

Power users who want to maintain different versions of the HairStudio databases can manually make copies of the default database and rename those copies or place them in another folder.

HairStudio connects automatically to the default HairStudio database on start-up but it is possible to select any other HairStudio database using the 'open database' button which is located at the bottom of the home page to the left of the [Home] button, see Figure 31.



Figure 31

Open database button.

Note that the actually selected database is always listed at the bottom of the home page between the [Back] and the [Home] buttons.

Important: If HairStudio is no longer connecting to the default HairStudio database on start-up then it should be pointed again to the default HairStudio database using the 'open database' function.

6 Example cases

The following instructions serve as a hands-on exercise resulting in reference result sets.

6.1 Case 1: NL 3 years

Purpose

Generate a timegraph with indicator results based on multiple years with usage data.

Description

This case is based on the following selections:

- Databases
 - dbHAIR_v6
 - dbCOMPOUND_v3
 - **dbUSAGE_NL_v5**
- Evaluation period: 1998-2008
- Area selection: Netherlands (4 regions: NL1, NL2, NL3, NL4)
- Compound selection: 5 out of 94 compounds (ids: 128 ,177, 385, 796)
- Crop selection: 7 out of 8 application crops (ids: 26, 52, 141, 157, 183, 191, 203)

Steps

1. Start Hair, create a new project (or open an existing project) and add a new case
2. Case settings: Name the case "Demo Case 1" and select the databases and evaluation period as above.
3. Area selection: Select country "Netherlands"
4. Compound and crop selection: select the crops (by id) as listed above
5. Save the case, proceed to Calculation, start the calculations and select [View Hair Output] when the calculations are finished.
6. Select [Open Last Output] in the HairOutputViewer, wait for the file to load and [Save to HairStudio]
7. [Open HairStudio] and create the presentations as listed in the next paragraph.

Results

Indicator: mammals_rwc_acute

distribution statistics per "chemical class", crop

chemical class	crop	mean	(n)	p0.05	p0.10	p0.25	p0.50	p0.75	p0.90	p0.95
undefined	Flowers and ornamentals (protected)	0,0E+000	3648	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000
pyrethroid	Winter wheat	3,4E-002	2520	2,1E-002	2,1E-002	2,9E-002	3,2E-002	4,1E-002	4,1E-002	4,1E-002
pyrethroid	Tomatoes (protected)	0,0E+000	1824	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000
pyrethroid	Sugar beet	4,9E-003	512	4,3E-003	4,3E-003	4,3E-003	4,3E-003	5,3E-003	5,3E-003	5,3E-003
pyrethroid	Potatoes ware	1,7E-002	4284	0,0E+000	1,1E-003	1,5E-002	1,9E-002	2,2E-002	2,2E-002	2,9E-002
pyrethroid	Pears	7,6E-002	3372	2,0E-002	2,3E-002	2,8E-002	6,7E-002	7,1E-002	1,1E-001	2,5E-001
pyrethroid	Flowers and ornamentals (protected)	0,0E+000	9728	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000
pyrethroid	Celery (outdoor)	2,3E-002	3348	0,0E+000	0,0E+000	0,0E+000	0,0E+000	5,3E-002	7,7E-002	7,8E-002
neonicotinoid	Sugar beet	1,3E-002	256	1,2E-002	1,2E-002	1,2E-002	1,2E-002	1,2E-002	1,2E-002	1,2E-002
neonicotinoid	Potatoes ware	1,3E-002	612	1,2E-002	1,2E-002	1,2E-002	1,2E-002	1,3E-002	1,3E-002	1,3E-002
neonicotinoid	Pears	6,7E-002	1124	2,9E-002	2,9E-002	2,9E-002	5,3E-002	7,2E-002	1,1E-001	1,1E-001
neonicotinoid	Flowers and ornamentals (protected)	0,0E+000	912	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000
carbamate	Winter wheat	1,2E-002	1400	0,0E+000	0,0E+000	6,4E-003	1,3E-002	1,4E-002	2,7E-002	2,7E-002
carbamate	Sugar beet	9,4E-003	1280	0,0E+000	0,0E+000	4,3E-003	1,2E-002	1,4E-002	1,4E-002	1,4E-002
carbamate	Potatoes ware	1,3E-003	1530	0,0E+000	0,0E+000	0,0E+000	0,0E+000	2,1E-003	3,2E-003	3,2E-003
carbamate	Flowers and ornamentals (protected)	0,0E+000	912	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000	0,0E+000

Figure 32

Case 1 – result 1: Table.

Case 1 – result 1

- Indicator: mammals_rwc_acute
- Presentation type: Other
- Break-down option: Chemical class, crop
- Visualization: Table

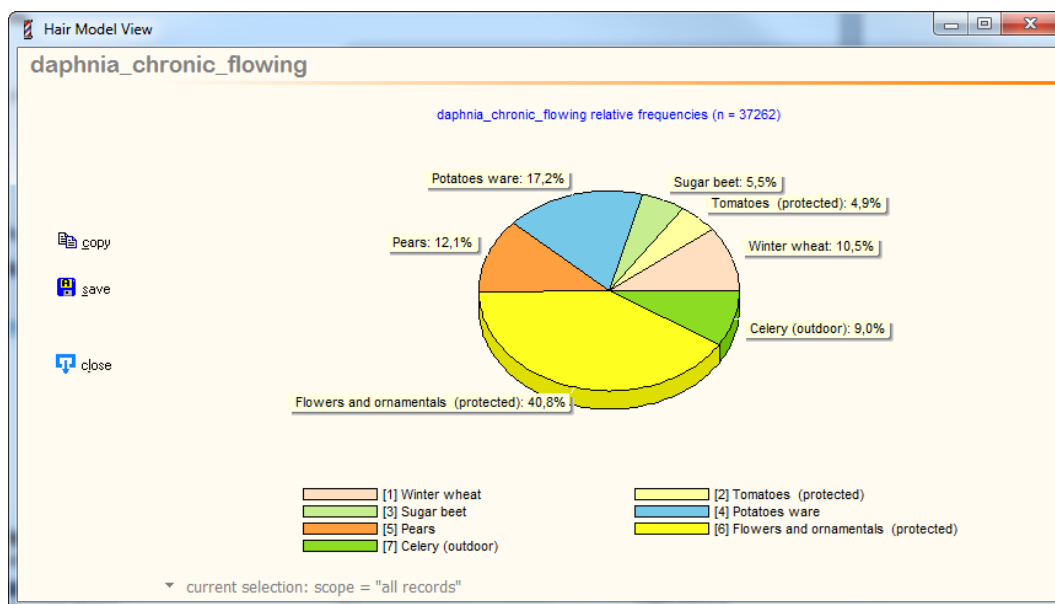


Figure 33

Case 1 – result 2: Pie chart.

Case 1 – result 2

- Indicator: daphnia_chronic_flowling
- Presentation type: Other
- Break-down option: Crop: crop
- Visualization: Pie



Figure 34
Case 1 – result 3: Time series.

Case 1 – result 3

- Indicator: algae_acute_flowling
- Presentation type: Other
- Break-down option: Time: one year
- Visualization: Time Series

6.2 Case 2: EU 1 application

Purpose

Show the maximum spatial extent of calculations, based on hypothetical application data.

Description

This case is based on the following selections:

- Databases
 - dbHAIR_v6
 - **dbCOMPOUND_DEMO_v1**
 - **dbUSAGE_EU_DEMO_v1**
- Evaluation period: 2001-2001
- Area selection: All regions (EU-25: EU without Cyprus and Malta), 202 regions
Note selecting all Member States (i.e. including Cyprus and Malta) would give similar results because crop maps and soil maps for Cyprus and Malta are not available in HAIR.
- Compound selection: 1 out of 3 test compounds (id: 1 “HAIR_TEST_A”)
- Crop selection: 1 out of 1 application crops (id: 148 “Permanent grassland”)

Number of gridcells: 42472

Number of application records: 202

Steps

1. Start Hair, create a new project (or open an existing project) and add a new case
2. Case settings: Name the case "Demo Case 2" and select the databases and evaluation period as above.
3. Area selection: Select all countries
4. Compound and crop selection: select the crops (by id) as listed above
5. Save the case, proceed to Calculation, start the calculations and select [View Hair Output] when the calculations are finished.
6. Select [Open Last Output] in the HairOutputViewer, wait for the file to load and [Save to HairStudio]
7. [Open HairStudio] and create the presentations as listed in the next paragraph.

Results

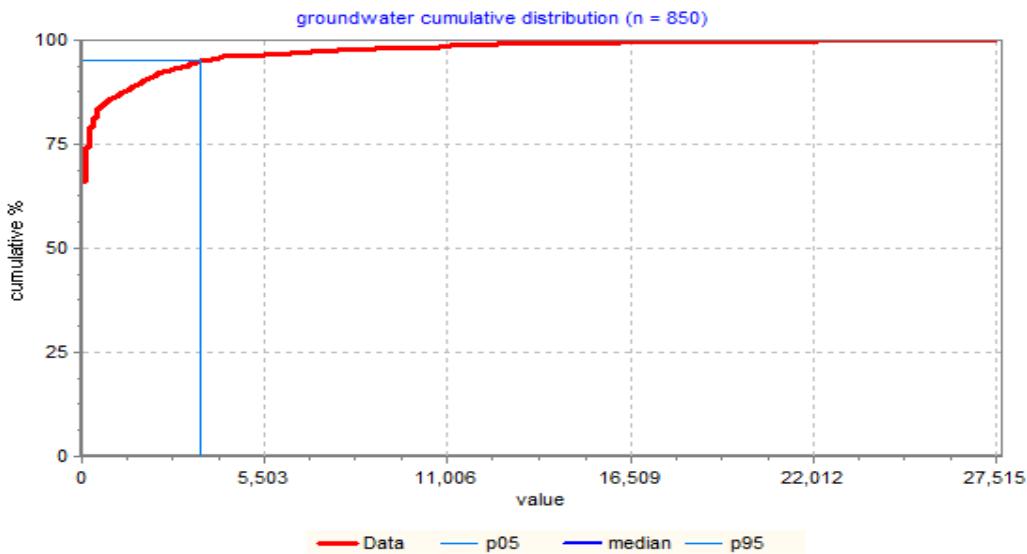


Figure 35

Case 2 – result 1: Cumulative distribution, groundwater indicator, Portugal.

Case 2 – result 1

- Area: Country, Portugal
- Indicator: groundwater
- Presentation type: Other,
- Break-down option: none
- Visualization: Cumulative

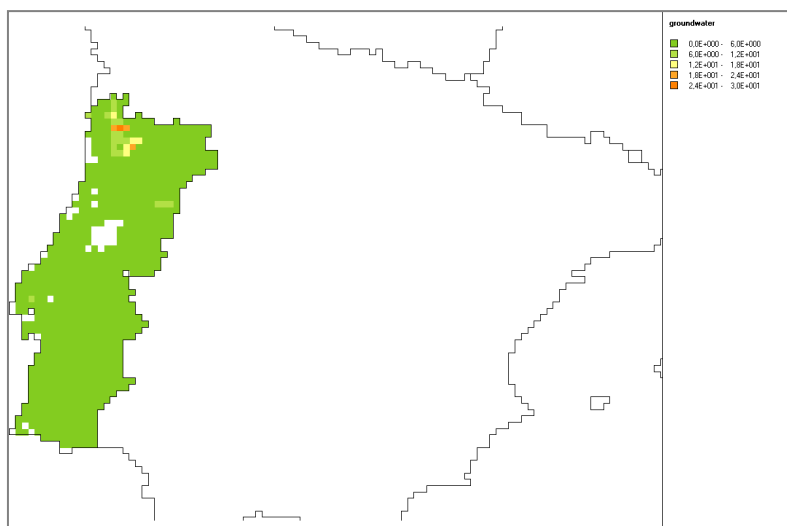


Figure 36
Case 2 - result 2: Map of groundwater indicator, Portugal.

Case 2 – result 2

- Area: Country, Portugal
- Indicator: groundwater
- Presentation type: Map, detail level 10 km grid, Map
- Break-down option: none

Elaborate discussion of results Case 2

Case 2 results are also elaborated in another example, the purpose of which is to show the extent of the area for which HAIR can calculate risk indicators.

Table 8
Physico-chemical properties for 3 hypothetical compounds (Example database dbCOMPOUND_DEMO_v1).

Property	Dimensions	HAIR test compound		
		A	B	D
Molar mass	g mol ⁻¹	300	300	300
Vapour pressure	mPa	1000	1000	1000
Solubility	mg L ⁻¹	90	90	90
DegT50 in soil	D	60	20	20
Sorption coefficient	L kg ⁻¹	60	10	35
pH dependent sorption	-	N	N	N

Figure 37 shows a map with the groundwater indicator calculated for HAIR test compound A (Table 8) resulting from one hypothetical, single application in grassland. The application date is October 1st, and the application rate = 1 kg ha⁻¹.

Depending on the crop calendar region, the crop interception fraction ranges from 0.40 to 0.75. The calculated cumulative volatilisation from the soil surface (CV_{soil}) ranges from 33 to 55 %. These high amounts are explained by the high vapour pressure of the test compound. The model multiplies the application rate with the calculated net soil deposition fraction ($0.11 < NSDF < 0.40$) and the nominal leaching concentration C_L ($\mu\text{g L}^{-1}$). The resulting exposure is divided by the drinking water criterion ($\mu\text{g L}^{-1}$) to obtain the risk indicator for leaching towards deeper groundwater (Kruijne et al., 2011, HAIR documentation, Chapters 2 and 4).

The map (Figure 37) shows that high risk indicator values are calculated in regions of high precipitation surplus (Figure 38). The precipitation surplus map (q in mm d^{-1}) is obtained from the annual precipitation amount (Kruijne et al., 2011, HAIR documentation, Equation 81).

Figure 37 is based on the HAIR csv output file, created in ArcMap (ESRI Inc. TM). Please note that HAIR Studio can only create maps and other presentations at country level.

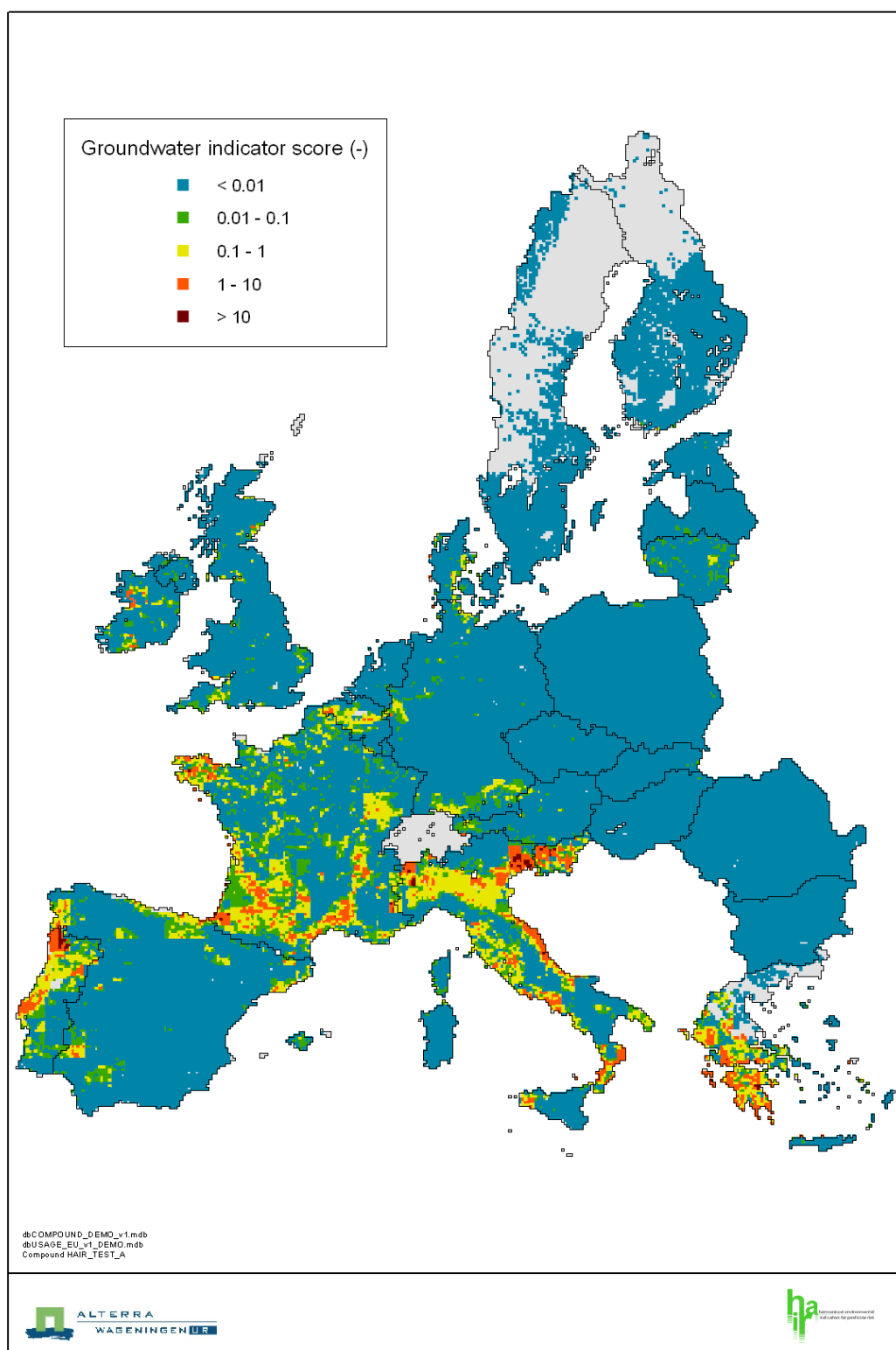


Figure 37
Map showing the groundwater risk indicator for leaching towards deeper groundwater. Hypothetical compound HAIR_TEST_A, Example 2.

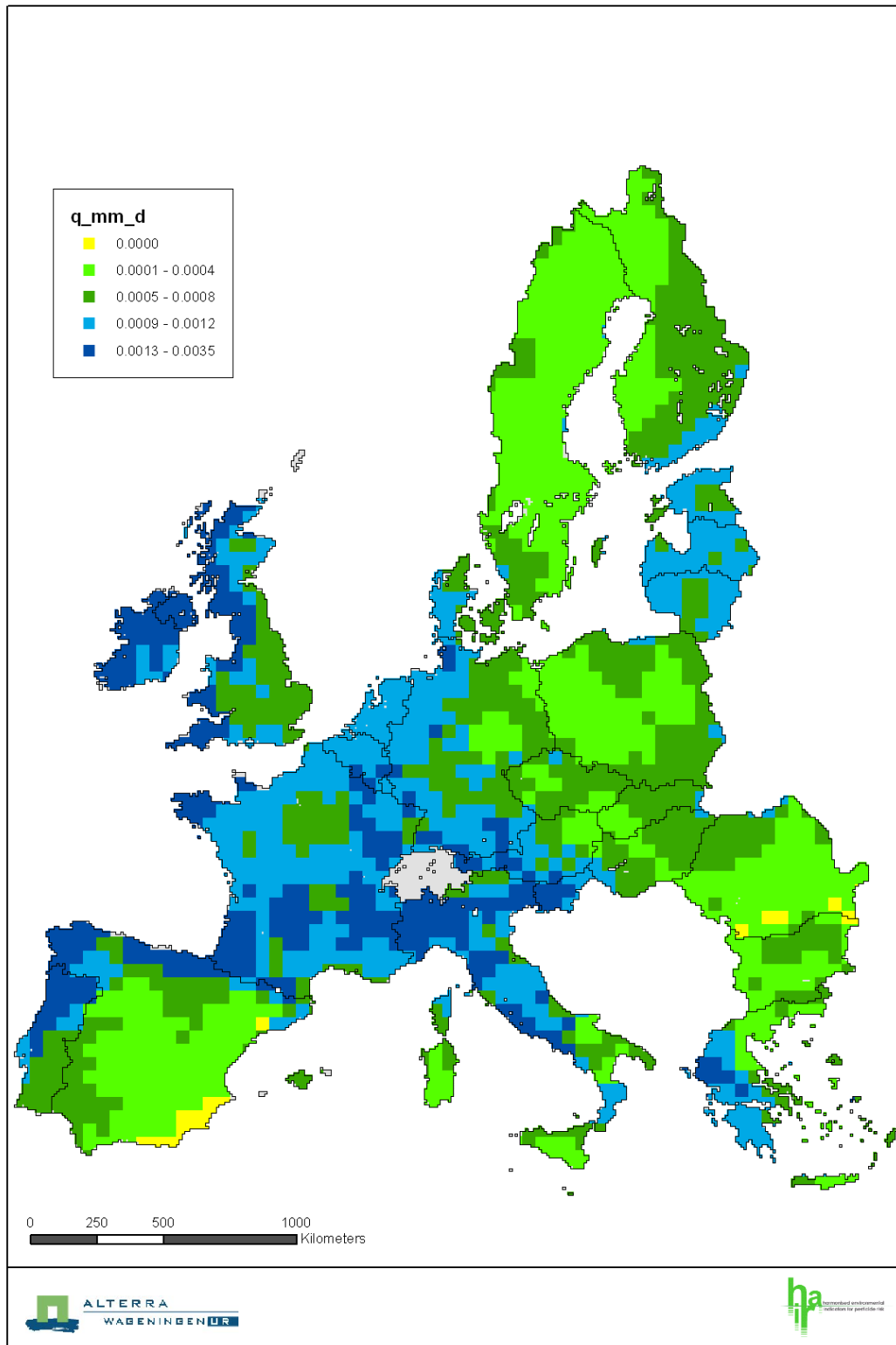


Figure 38

The precipitation surplus map (q in mm d-1) obtained from the annual precipitation amount (Krujine et al., 2011, HAIR documentation, Equation 81).

6.3 Case 3: UK multiple applications

Purpose

Explore the regional based usage database from the UK, 2004 delivered by the original Hair consortium.

Description

This case is based on the following selections:

- Databases
 - dbHAIR_v6
 - dbCOMPOUND_v3
 - **dbUSAGE_UK_v3**
- Evaluation period: 2004-2004
- Area selection: UK (11 regions: UK2, UK3, UK6, UK7, UK9, UKA, UKB, UKC, UKD, UKH, UKI_J)
- Compound selection: ALL compounds (183)
- Crop selection: 1 out of 8 application crops (id: 142)

Number of gridcells: 2365

Number of application records: 180

Steps

1. Start Hair, create a new project (or open an existing project) and add a new case
2. Case settings: Name the case "Demo Case 3" and select the databases and evaluation period as above.
3. Area selection: Select country "UK"
4. Compound and crop selection: select the crops (by id) as listed above
5. Save the case, proceed to Calculation, start the calculations and select [View Hair Output] when the calculations are finished.
6. Select [Open Last Output] in the HairOutputViewer, wait for the file to load and [Save to HairStudio]
7. [Open HairStudio] and create the presentations as listed in the next paragraph.

Results

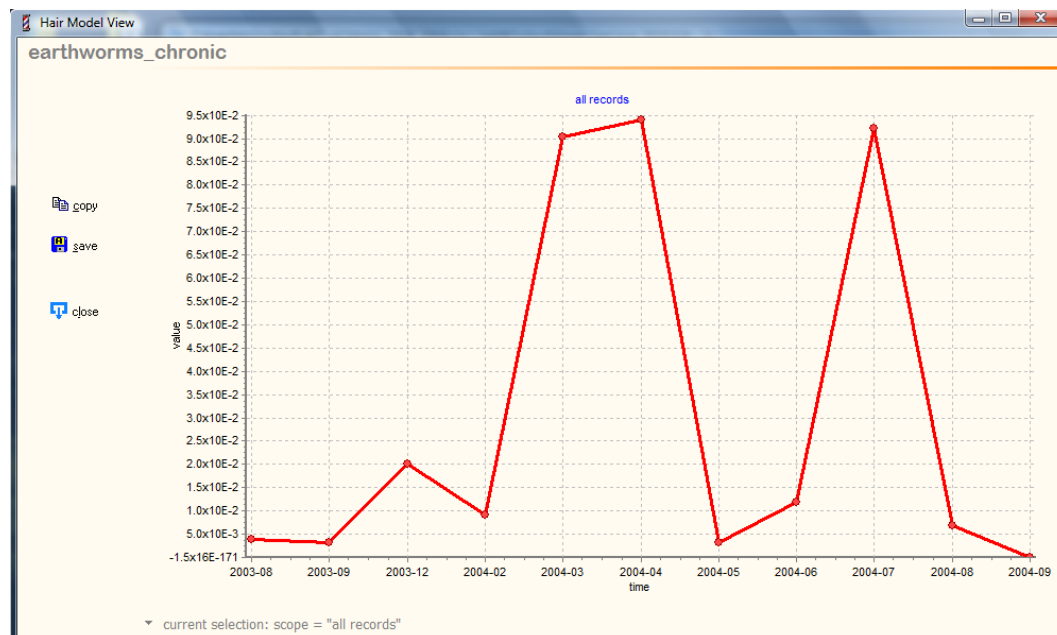


Figure 39

Case 3 – result 1; earthworm chronic indicator in UK, Time Servies.

Case 3 – result 1

- Indicator: earthworms_chronic
- Presentation type: Other
- Break-down option: Compound: none, Crop: none, Scale: Region, Time: one month
- Visualization: Time Series

In order to view a selected region and period (month), you can chose in HairStudio the pull-down button on the bottom of the screen en select for example Scotland as shown in Figure 40.

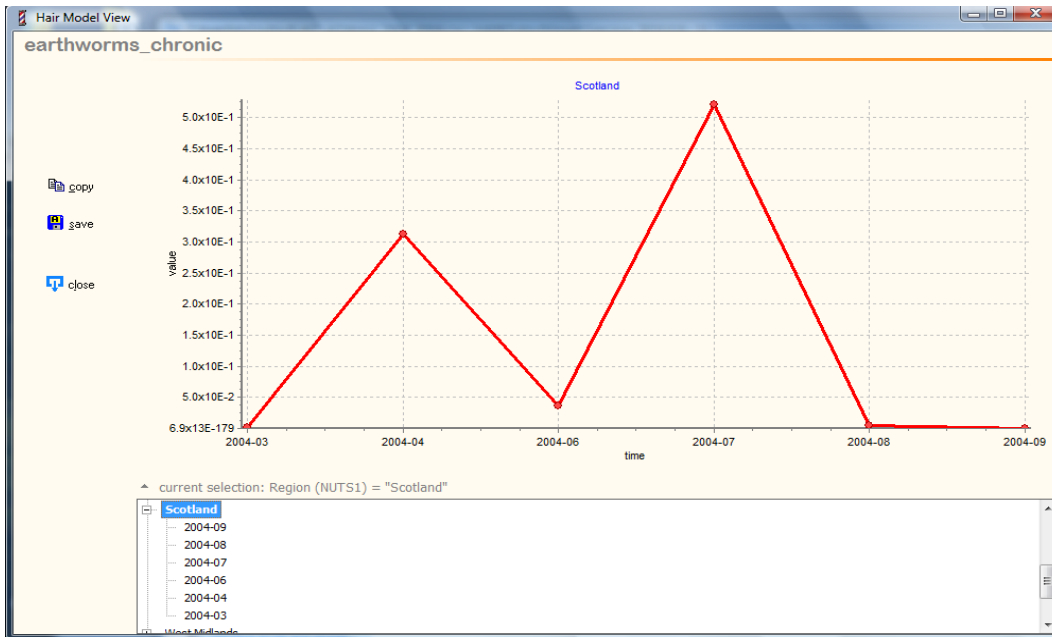


Figure 40

Case 3 – result 2; earthworm chronic indicator in UK, Region Scotland, Time Series per month.

References

Kruijne, R., J.W. Deneer, J. Lahr and J. Vlaming, 2011. HAIR2010 Documentation - Calculating risk indicators related to agricultural use of pesticides within the European Union. Alterra, Wageningen UR, Report 2113.1, 202 p.

Annex 1 Hardware and software requirements

Windows

The HAIR2010 package will function only on Microsoft (MS) Windows PCs and has been tested with Windows XP, Windows Vista and Windows 7. Older versions of Windows are not tested and not supported.

Office

HAIR2010 does not require a version of MS Office to run but MS Excel is required for the creation of Hair summary reports from the HairOutputViewer.

MS Access is used for storage of input data and as temporary storage of results for HairOutputViewer and HairStudio.

Pdf

Documentation is provided in pdf format for which the free Adobe Reader can be downloaded (<http://get.adobe.com/reader/>)

Hardware

HAIR2010 will run on most recent and up to date hardware that runs the above mentioned versions on MS Windows.

Platform test

HAIR2010 has explicitly been tested for the following combinations of MS Windows, MS Office and regional settings.

Table 9

Platforms tested with HAIR2010.

Office → Windows	2000	2003	2010
XP	X (US)	X (US)	X (US, NL, FR)
VIST32		X (US)	
W7 32			X (US, FR)
W7 64	X (US, NL)		

MapObjects

HAIR2010 requires the ESRI MapObjects LT™ software to display maps for area selection and results in Hair2010 and HairStudio.

MapObjects is installed as part of the HAIR2010 setup. See Annex 2: Installation.

Annex 2 Installation

The HAIR2010 setup requires that the user has **administrator rights** on Microsoft Windows Vista and Windows 7 during installation. HAIR2010 does **not** require administrator rights during normal use.

Windows Vista and Windows 7 do not allow standard users to install new software (see: <http://support.microsoft.com/kb/308116>). Administrator rights are not required to run the software after installation.

In case an administrator user is installing HAIR2010 for a standard user: make sure that the Hair data folder is not installed to the user folder (My documents) of the administrator user. This will make the HAIR data files inaccessible for the standard user when running the software with standard privileges.

1. Start the HAIR2010 installation by double-clicking the HAIR2010-setup.exe file.
2. On the "Welcome page", click [Next >]
3. On the "Select Destination Location" page select where the HAIR2010 software should be placed. Optionally, use [Browse...] to select an alternative location. Click [Next >].
4. On the "HAIR Data Folder location" page select where the HAIR2010 data should be placed. Optionally, use [Browse...] to select an alternative location. Click [Next >].
5. Select "Full installation" on the "Select Components" page unless you are re-installing part of the software. Click [Next >].
6. Provide a name for the HAIR2010 folder in the Windows Start Menu.
7. Select Additional Tasks. Check the option if you want a copy of the Start Menu HAIR2010 folder on your desktop for quick access. Click [Next >].
8. The "Ready to Install" page lists the options selected. The [< Back] can be used if these options need to be changed. Otherwise click [Install].
9. The setup will now copy files to your PC.
10. A pop-up will appear with the message that the MapObjects installation was successful. Close this dialog.

Try the following if the installation of MapObjects is **not successful**:

- Run the MapObjects installer that is provided on CD-ROM.
- Restart your PC

If all fails; contact the author of the HAIR2010 Documentation with a copy of file C:\Program Files\ESR\MapObjectsLT2\MapObjectInstallation.log and details on your version of MS Windows and Office.

11. The last page asks whether HAIR should be launched and [Finish] will close the installation and, optionally, start Hair2010

HAIR2010 installs software and data files to different locations on your PC.

- **HAIR2010 Program files:**
The main program files are installed to “C:\Program Files\Alterra\HAIR2010”(or “C:\Program Files (x86)\Alterra\HAIR2010”on 64-bit versions of Windows).
- **HAIR2010 Data Folder:**
HAIR (user) data (databases, manuals, project definitions and output files) are installed to a user selectable folder. If the user does not change the default option then this will default to the “shared documents” folder on the PC (C:\Users\Public\Documents\HAIR2010).
- **MapObjects LT2**
ESRI MapObjects is an external piece of software that is required for the display of maps in Hair2010 and HairStudio. HAIR will display an error message when Hair2010 is started without MapObjects being properly installed.

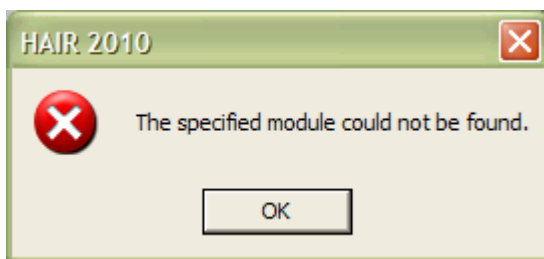
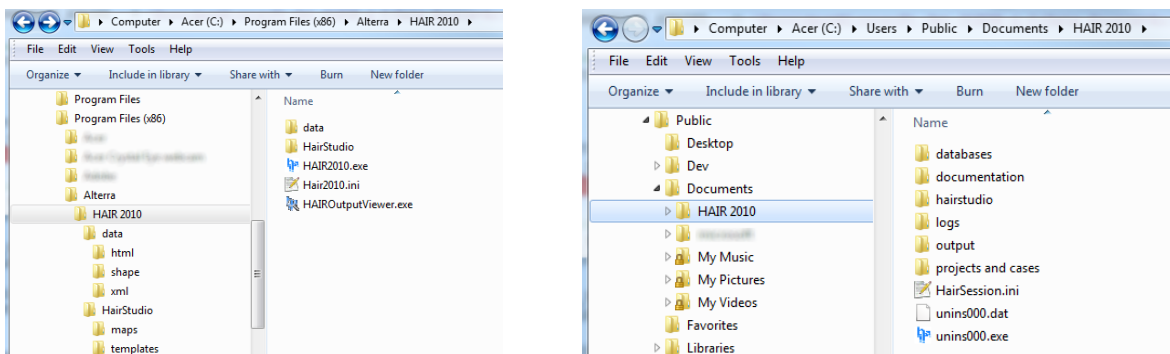


Figure 41
Error message when starting Hair2010 without MapObjects being installed.

MapObjects LT2 is installed to the program files folder“C:\Program Files\ESRMapObjectsLT2”



HAIR2010 Program Files folder
(this example: on Windows 7 64-bit)

HAIR2010 Data Folder

Figure 42
Folder structure HAIR 2010 after default installation.

HAIR2010 will not be able to find default folder and file locations if the data folder is moved to a different location after installation. In this case the user will have to edit the file and folder locations in the [Setup] section of the hair2010.ini file (C:\Program Files\Alterra\HAIR2010\hair2010.ini) which requires administrator

privileges. Alternatively, the setup procedure can be repeated while selecting the correct location for the Hair data folder on the “Select Destination location” page of the setup wizard.

Hair will install a HAIR2010 group in the Windows Start Menu and the software can be started from there.

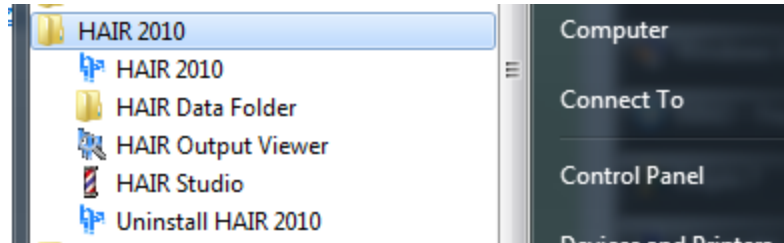


Figure 43
HAIR 2010 group in the Windows Start Menu.

Annex 3 Known issues

The HAIR2010 software (version 1.0) has the following known issues. These will be solved in next releases.

Hair2010

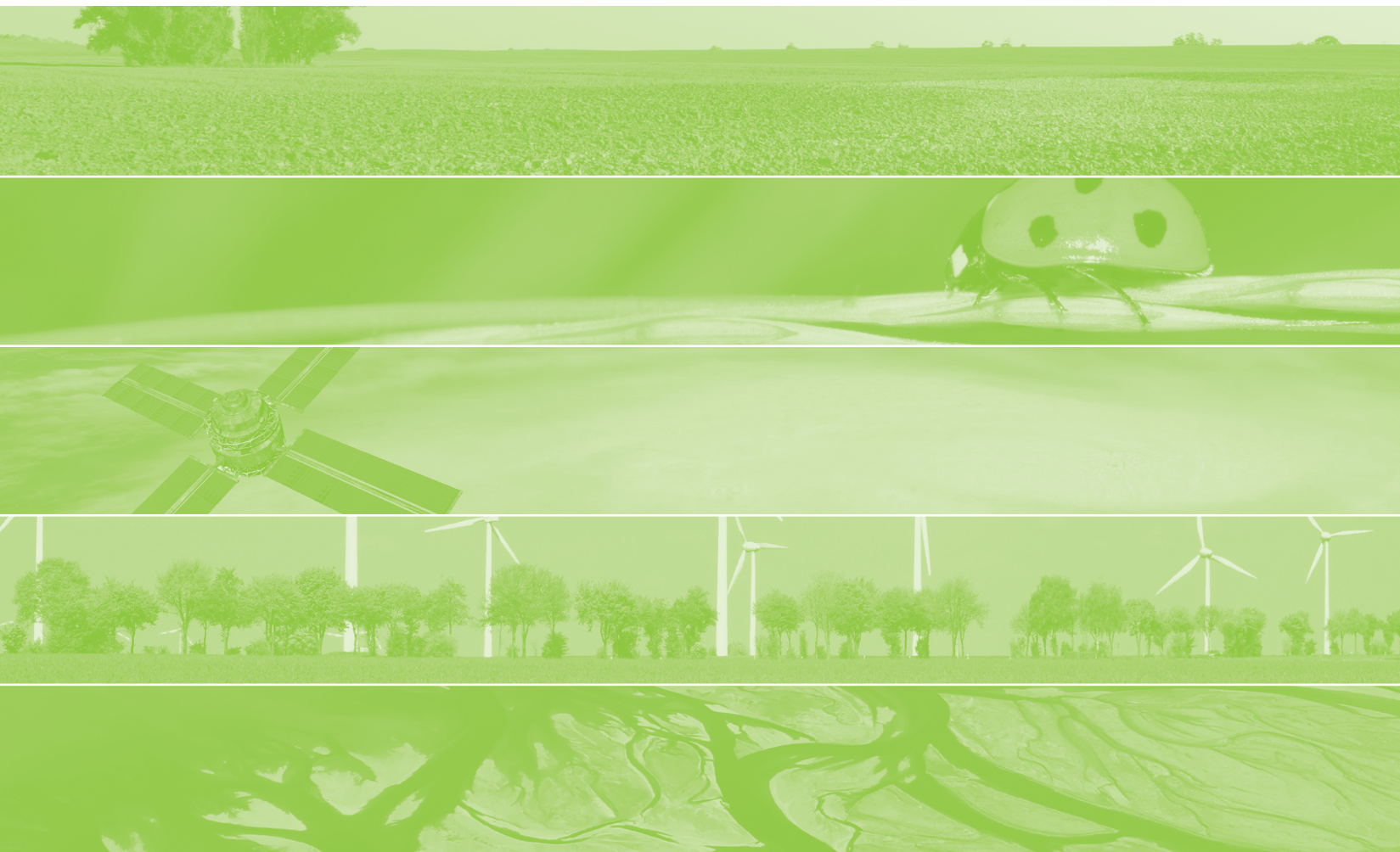
- Hair2010 will produce error messages -and can only be closed using the Task Manager- if it is started while MapObjects is not properly installed.
- Compound status is showing data from previous case when no compound database is selected for case.

Hair Output Viewer

- Saved reports display values as text in MS Excel when the Windows regional settings language is not the same as the language of the MS Office version used.

HairStudio

- Legend classes: sometimes most or all values are classified in the same legend class.
- Graphs: X-axis value/label distribution not optimized.
- Graphs: Y-axis value in some case set to very small value (> 0).



Alterra is part of the international expertise organisation Wageningen UR (University & Research centre). Our mission is 'To explore the potential of nature to improve the quality of life'. Within Wageningen UR, nine research institutes – both specialised and applied – have joined forces with Wageningen University and Van Hall Larenstein University of Applied Sciences to help answer the most important questions in the domain of healthy food and living environment. With approximately 40 locations (in the Netherlands, Brazil and China), 6,500 members of staff and 10,000 students, Wageningen UR is one of the leading organisations in its domain worldwide. The integral approach to problems and the cooperation between the exact sciences and the technological and social disciplines are at the heart of the Wageningen Approach.

Alterra is the research institute for our green living environment. We offer a combination of practical and scientific research in a multitude of disciplines related to the green world around us and the sustainable use of our living environment, such as flora and fauna, soil, water, the environment, geo-information and remote sensing, landscape and spatial planning, man and society.

More information: www.alterra.wur.nl/uk