



## WUIVIEW Natural Fuels database: Read Version

<b>WP - Task</b>	WP2 – Task 2.2	<b>Version <sup>(1)</sup></b>	Final
<b>Code (file name)</b>	D2.2_WUIVIEW Natural Fuel Read Version	<b>Dissemination level <sup>(2)</sup></b>	Public
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<b>Abstract</b>	The database contains 21 entries of different vegetation elements which can be present at the WUI microscale. Their geometry and burning characteristics are gathered in consonance with FDS simulation setting needs. The database has been conceived as a live product, that can be further populated according to WP7 (Development of study cases) needs and to further requirements during the WUIVIEW exploitation phase. This document offers a readable access to the database published in the Deliverable D2.2 Database on natural fuels burning characteristics.
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(1) Draft / Final

(2) Public / Restricted / Internal

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## 1. About this document

This document explains the access and usability of the WUIVIEW database (readable version) on WUI natural fuels burning characteristics. The information gathered in such a database will serve as input in FDS (Fire Dynamics Simulator) simulations. This database is a readable version of the WUIVIEW Database presented in the Deliverable 2.2.

**IMPORTANT:**

Once unzipped the file WUIVIEW\_DB\_Natural\_Read\_Version.ZIP, a folder called “WUIVIEW\_DB\_Natural\_Read\_Version” will be created.

This folder should be copied into the path C:\ in order to execute the database. If the folder is not into the correct path, an error message will be displayed and the database cannot be executed.

The correct path is C:\WUIVIEW\_DB\_Natural\_Read\_Version

In the folder, users will find two files:

- File 1: Database Report on natural fuel burning characteristics (REPORT\_Natural\_Fuels.accdb). This file is public and users have access to the information of the reports. Users must use this file in order to query the natural fuel reports.  
Remember that the correct path to execute the file is:  
C:\WUIVIEW\_DB\_Natural\_Read\_Version\REPORT\_Natural\_Fuels.accdb
- File 2: Database on natural fuel burning characteristics. (WUIVIEW\_DB\_Natural\_Fuels\_READ.accdb). The management and content of the database is private. To access this file, a password is required.

In the next section, a detailed description of the REPORT\_Natural\_Fuels database is explained.

## 2. Use of the REPORT\_Natural Fuels database

In order to carry out the FDS simulations of WUI natural fuel-based fires it is key to develop a database where information of the different natural fuels can be added and modified. In addition, this database will be a useful tool to exchange information between different parties using a standard format. To this end, UPC has developed an Access database to gather natural fuel properties. This database will enable us to consult useful information about natural fuels in a standardized format.

### 2.1. How to manipulate the Access Database

This database presents an intuitive user interface. Find below a brief explanation on how to use it.

#### 2.1.1. Open the database

To work with this database, it is necessary to have the Microsoft Access database management system installed. Once this software has been installed, run the file called **“REPORTS\_Natural\_Fuels.accdb”**. Once the new database application has been opened, click on the **“Enable content”** button at the top of the start form (see Figure 1). This will enable code and unsafe macros in the database and reopen the database application in trusted mode. Depending of the computer and Microsoft access version, this step is activated by default.

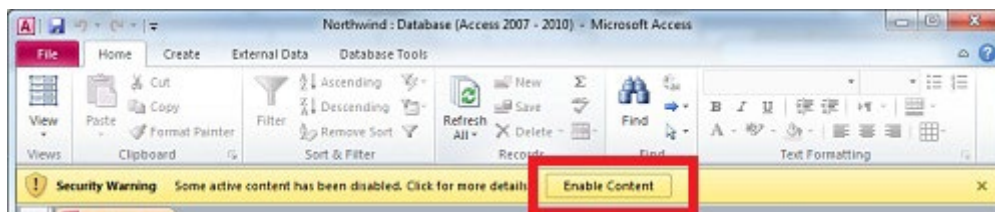


Figure 1. Security warning message to enable the content of the database

#### 2.1.2. Query and report forms

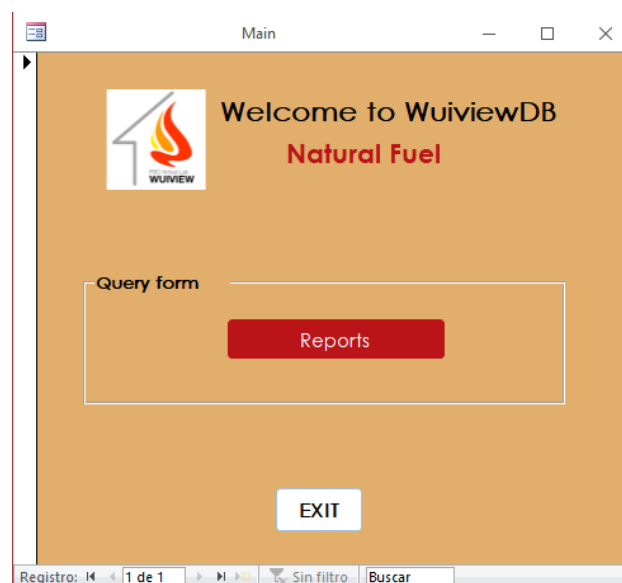


Figure 2. Welcome to WuiviewDB Natural Fuel

Figure 2 shows the main menu window of the database. To access to the query form and visualize all the reports, users should press the **Reports** button within the Query form panel. Next step consists on selecting the type of list to be consulted: a) a complete list of fuel types; b) a complete list of properties with their description; c) a complete list of species sorted by fuel type gathered in the database. A search option is also available, composed by: a) a report containing all the information of a specific specie; b) a list of the attached files related to a specific specie; c) a report containing all the geometry of a specie; d) a list of the attached files related to the geometry of a specie.

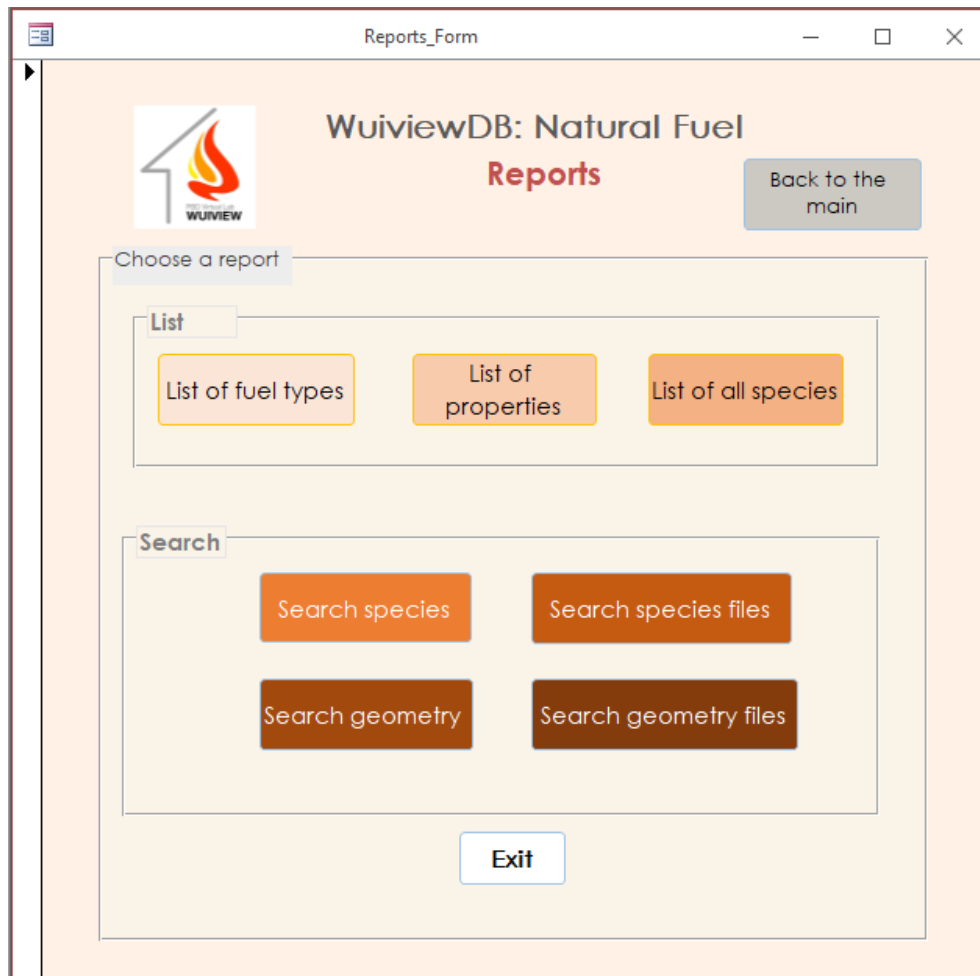
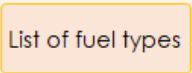


Figure 3. Options to generate a report form on the WuiviewDB on natural fuels

2.1.3. List of fuel types

By pressing the  button, a list of all the fuel types is automatically generated. Figure 4 shows an example of the window format with the generated report. At the moment, only three different fuel types are stored in the database (tree, hedge, shrub).

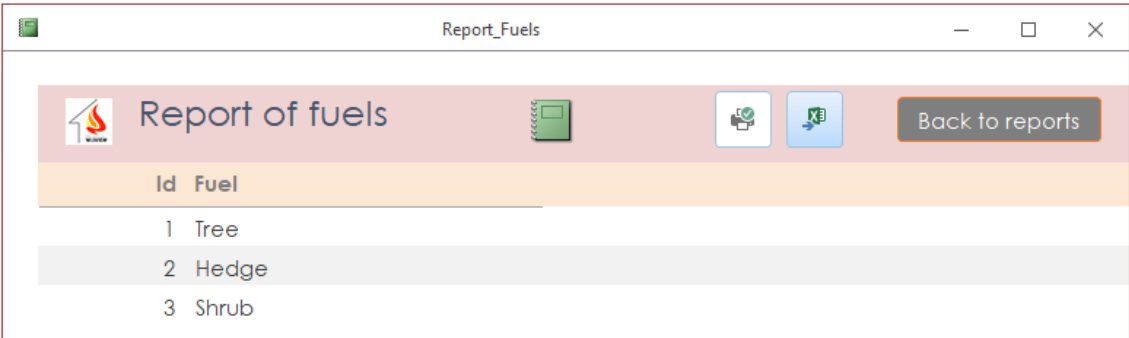

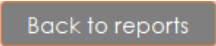


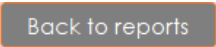


Figure 4. Example of the generated report with the list of the natural fuels





On the top menu of the window, two options  allow the users to export this information: printing and generating the content in a file. After pressing the corresponding button, users must select the format file such as EXCEL file, TXT file, PDF file among others. To go back to the main menu, it is preferable to use the  button instead of closing the window.

2.1.4. List of properties

By pressing the  button, a list of all the properties stored in the database is automatically generated. Figure 5 shows an example of the window with the generated report.

On the top menu of the window, two options  allow the users to export this information: printing and generating the content in a file. After pressing the corresponding button, users must select the format file such as EXCEL file, TXT file, PDF file among others. To go back to the main menu, it is preferable to use the  button instead of closing the window.

Report\_Properties

 Report of Properties   

Back to reports

Name	Description
$\Delta H_C$	Heat of combustion volatiles
Burning area	Surfaces of the fuel in contact with the exterior
MLR	Mass Loss Rate
HRR	Heat Release Rate
HRRPUA	Heat Release Rate per Unit Area
$a$ (Growth Rate)	Growth rate
Spread rate	Spread rate
CRHF	Critical Heat Flux
Vegetation properties	Mass percentge, MC, $\sigma$ , $\rho b$
Density $\rho_o$	Density of the natural material Density of the naturalDensity of the natural on dry basis

Figure 5. Example of the generated report with the list of the properties of the database



2.1.5. List of all species

By pressing the 

List of all species

 button a list of all the species sorted by fuel type is automatically generated. Figure 6 shows an example of the window form with the generated report.

On the top menu of the window, two options 

 allow the users to export this information: printing and generating the content in a file. After pressing the corresponding button, users must select the format file such as EXCEL file, TXT file, PDF file among others. To come back to the main menu, it is preferable to use the 

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 button instead of closing the window.





Fuel	Species
Hedge	Cupressocyparis leylandii
Hedge	Cupressus arizonica
Hedge	Cupressus arizonica
Hedge	Thuja occidentalis
Shrub	Rosemary
Shrub	Manzanita
Shrub	Juniperus
Shrub	Orchid Rockrose
Shrub	Ray Hartman Ceanothus
Shrub	Chamise
Shrub	Saltbush
Shrub	Quail Bush
Shrub	Santa Barbara Ceanothus
Shrub	Sage leaved rock rose
Shrub	Spiny Saltbush
Tree	2m Douglas fir tree
Tree	Korean pine
Tree	Fraser Tree
Tree	Scotch Pine
Tree	5 m douglas fir tree
Tree	Norway spruce

Figure 6. Example of the generated report with the list of all species sorted by the fuel type

#### 2.1.6. Search species

This option allows the users to obtain a detailed content of a species. After pressing the **Search species** button, a pop-up window is displayed (Figure 7). As it can be seen, a list of all the species contained in the database, sorted by fuel type is shown. Users must select a specie on the listbox and all the information related with the specie will be displayed. Figure 8 shows an example of the generated form once the specie is selected from the pop-up window. This form is structured in two sections: a) description of the specie; b) list of all the associated properties with their content. Not all the information fields are filled, due to lack of data. In the example of Figure 8, it is important to visualize the number of associated properties. In this case, “Cupressus arizonica” has four properties but only two density properties are displayed. This means that this specie contains properties with associated files. For this reason, in order to visualize them, users should use a “search species files” button of the main panel option (see Fig. 3). This option is explained in the next section 2.1.7.

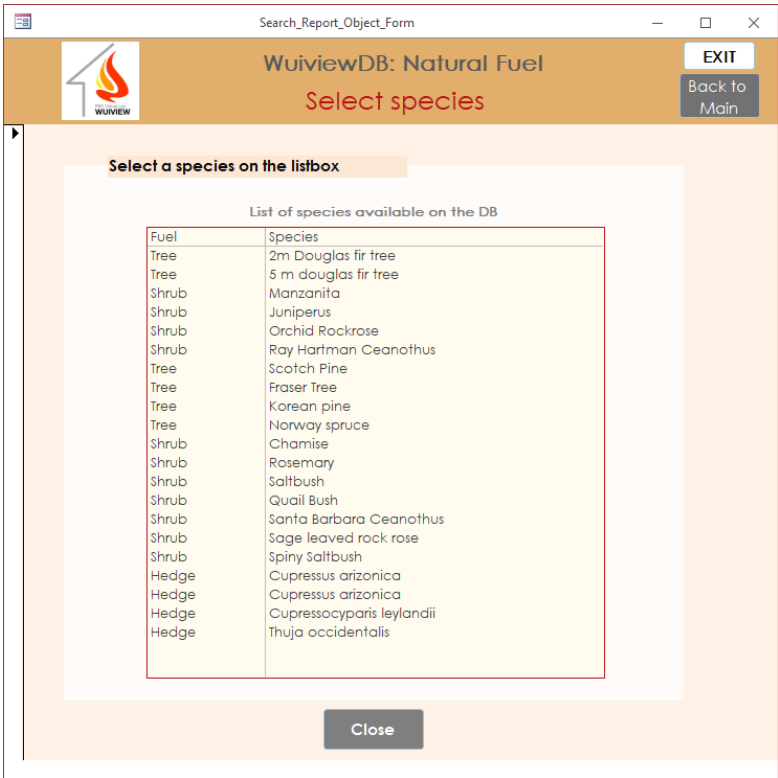


Figure 7. An example of the pop-up window with the list of species sorted by fuel type

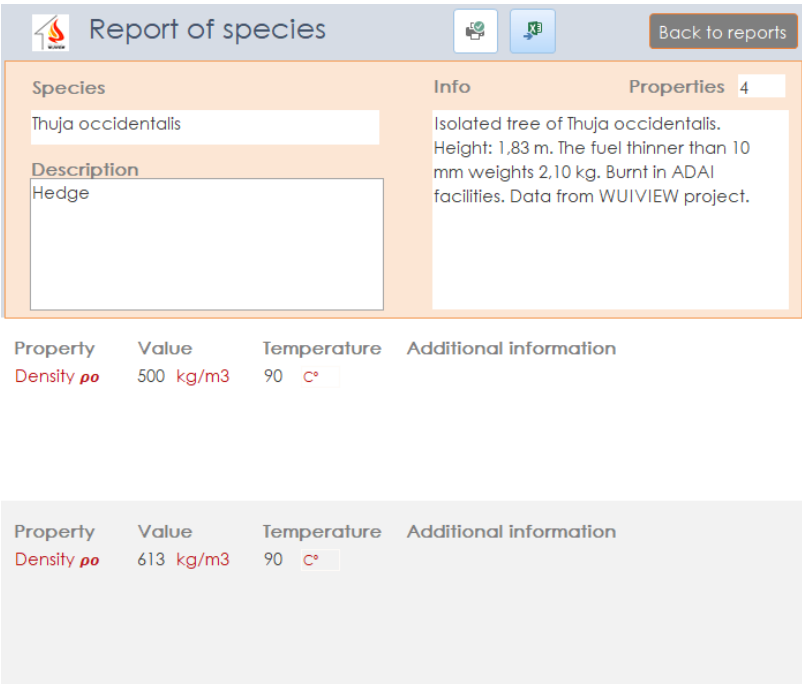



Figure 8. Example of the information related to the specie and a list of all the associated properties.

Finally, on the top menu of the window, two options  allow users to export this information: printing and generating the content in a file. After pressing the corresponding button, users should select the format file such as EXCEL file, TXT file, PDF file among others. To

go back to the main menu, it is preferable to use the [Back to reports](#) button instead of closing the window.

### 2.1.7. Search species files

This option allow the users to obtain a detailed content of a species. After pressing the [Search species](#) button, a pop-up window is displayed (Figure 9). A list of all the species contained in the database and sorted by fuel type is shown. Users must select a specie on the listbox and all the information related with the specie will be displayed. In previous example displayed in Figure 8, it was noticed that this specie contains properties with associated files. Figure 10 depicts an example of the generated form once the specie is selected from the pop-up window. This form is structured in two sections: a) description of the specie; b) list of all the associated properties with their content. Not all the information fields are filled, due to lack of data. Now, the “Cupressus arizonica” specie has several files regarding the MLR and Vegetation properties. It is possible to open them after clicking on the list panel (Figure 11). An example of an Excel file associated with the property MLR of the selected specie is depicted in Figure 12.

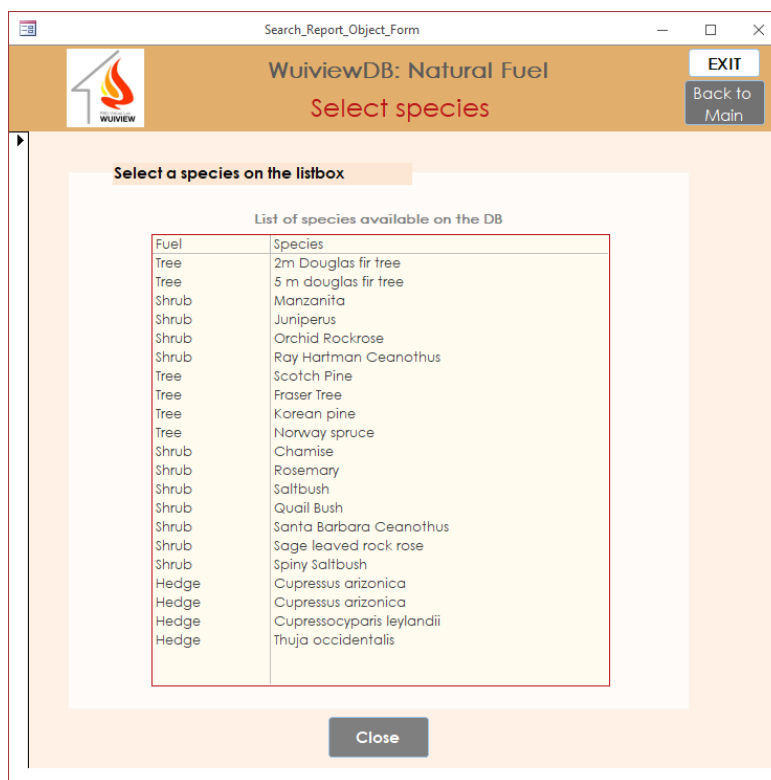





Figure 9. An example of the pop-up window with the list of species sorted by fuel type

 Report of species



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Species

Cupressus arizonica

Fuel

Hedge

Properties

4

Description

Isolated young tree of Cupressus arizonica. 0.243 meters high. Does not contain dead materials. Total amount of fuel thinner than 10mm is 0.57 kg. Total weight is 2.42 kg. Source: WUIVIEW project; experiments in ADAI facilities.

Property

MLR

Information

MLR of the sample

Attached files 1

MLR\_CA\_242.xlsx

Database\_CA\_242.xlsx

\* Press the box to display his content

Property

Vegetation prop

Information

Particle distribution, moisture content, sigma factor and bulk density of the sample, classified by diameters


Attached files 1

MLR\_CA\_242.xlsx

Database\_CA\_242.xlsx


\* Press the box to display his content

Figure 10. Example of the information related to the specie and a list of all the associated properties



Datos adjuntos

Datos adjuntos (haga doble clic para ver)

 MLR\_CA\_242.xlsx

Agregar...

Quitar

Ver

Guardar como...

Guardar todo...

Aceptar

Cancelar

Close

Figure 11. Example of the pop-up window to open an attached file of a property

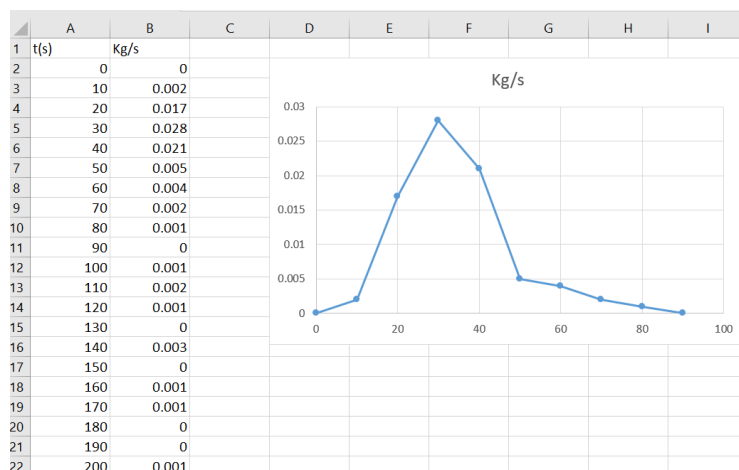


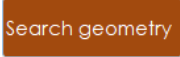


Figure 12. Example of an associated excel file related with the property of a specie

Finally, on the top menu of the window, two options  allow users to export this information: printing and generating the content in a file. After pressing the corresponding button, users should select the format file such as EXCEL file, TXT file, PDF file among others. To go back to the main menu, it is preferable to use the  button instead of closing the window.

#### 2.1.8. Search geometry

This option allow the users to obtain a detailed content of the geometry of the species. After pressing the  button, a pop-up window is displayed (Figure 13). As it can be seen, a list of all the species contained in the database and sorted by fuel type is shown. Users must select a specie on the listbox and all the information related with the geometry of each specie will be displayed. Figure 14 shows an example of the generated form once the specie is selected from the pop-up window. This form is structured in two sections: a) description of the specie; b) list of all the associated geometries with their content. Two different types of geometries are defined: simple or complex geometry. An example of a simple geometry of the specie “Chamise” is depicted in Figure 14. Complex geometries are shown in attached files. For this reason, users should use the option “search geometry files” to obtain all the complex geometries saved in an external file (see section 2.1.9).

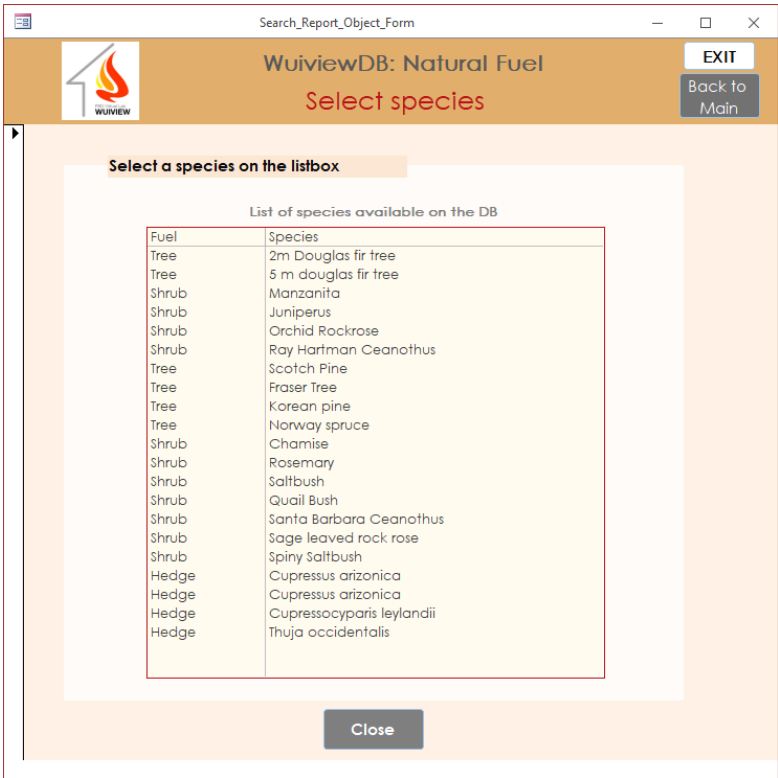


Figure 13. An example of the pop-up window with the list of species sorted by fuel type

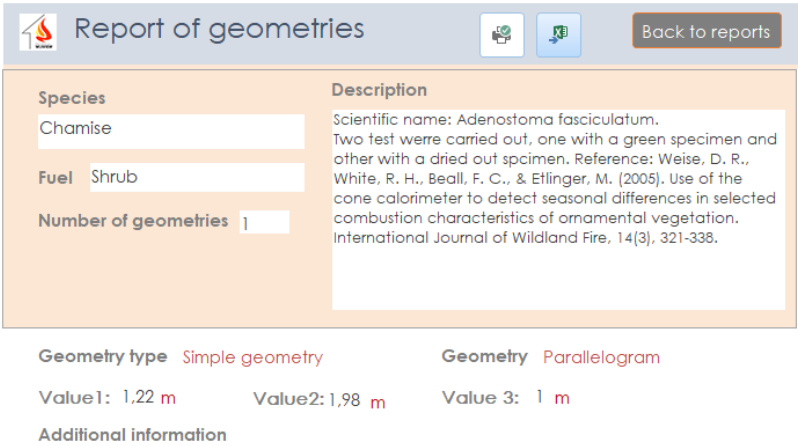

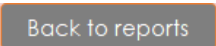


Figure 14. Example of the information related to the geometry of a specie

Finally, on the top menu of the window, two options  allow users to export this information: printing and generating the content in a file. After pressing the corresponding button, users should select the format file such as EXCEL file, TXT file, PDF file among others. To go back to the main menu, it is preferable to use the  button instead of closing the window.

### 2.1.9. Search geometry files

This option allows the users to obtain a detailed geometry of a species. After pressing the **Search geometry files** button, a pop-up window is displayed (Figure 15). As it can be seen, a list of all the species contained in the database and sorted by fuel type is shown. In this list, only the species that contain associated files are displayed. It is easier for users to visualize rapidly only the species that have complex geometries. Then users must select a specie on the listbox and all the information related with the specie will be displayed. Figure 16 shows an example of the generated form once the specie is selected from the pop-up window. This form is structured in two sections: a) description of the specie; b) list of all the associated geometry files with their content. Figure 17 shows an example of the content related with the specie “*Thuja occidentalis*”. As can be seen, this specie contains a complex geometry which is detailed in the attached file.

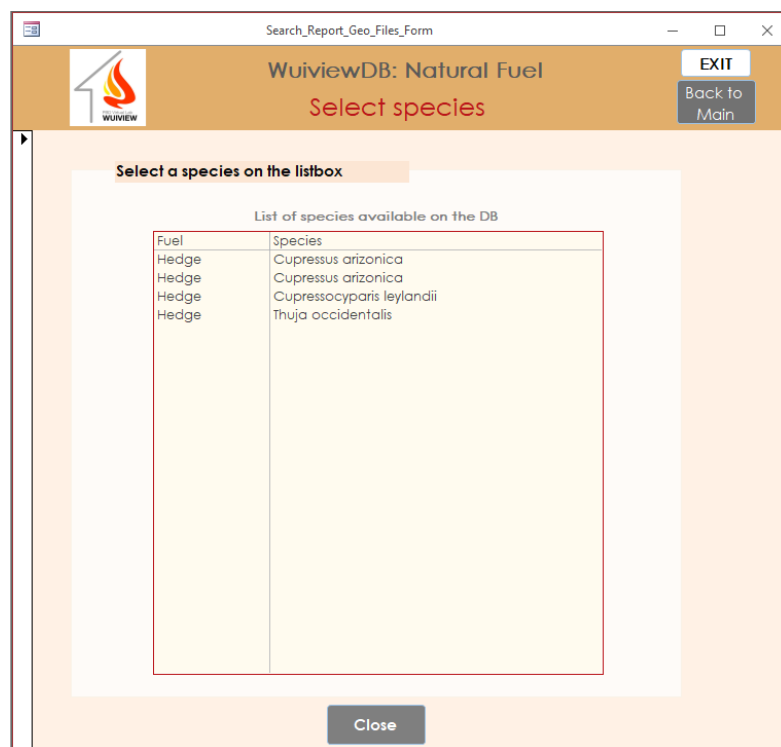





Figure 15. An example of the pop-up window with the list of species sorted by fuel type

 Report of geometry files



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Species

Thuja occidentalis

Fuel

Hedge

Number of geometries

1

Description

Isolated tree of Thuja occidentalis. Height: 1,83 m. The fuel thinner than 10 mm weights 2,10 kg. Burnt in ADAI facilities. Data from WUIVIEW project.

Geometry type

Group of geometries

Geometry

Geo Files

Number of files

1

Additional information

Complex geometry. Tree divided in three sections with the same height: top (cone), middle (truncated cone) and bottom (upside-down cone).

\* Select the file to display his content



Geometry.JPG

Figure 16. Example of the geometry information related to the specie and a list of all the associated files

Id	Geometry	Height (m)	Diameter (m)	Volume (m³)	TOTAL (m³)
Volume 1	Cone	0,61	0,49	0,15	1,21
Volume 2	Truncated cone	0,61	0,49 & 0,535	0,50	
Volume 3	Cone	0,61	0,535	0,55	

Close

Figure 17. Example of the content of the external file associated with the complex geometry of a specie



Finally, on the top menu of the window, two options allow users to export this information: printing and generating the content in a file. After pressing the corresponding button, users should select the format file such as EXCEL file, TXT file, PDF file among others. To go back to the main menu, it is preferable to use the 

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 button instead of closing the window.

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