Bio2Match-tool

User guide

Horizon 2020
European Union Funding
for Research & Innovation

Magic
Marginal lands for Growing Industrial Crops

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 727698.

Bio2Match tool

Bio2Match tool guides the user to the optimal match between biomass resources and conversion technologies. The conversion technologies have specific requirements for the biomass input while biomass varies widely in composition and characteristics.

The tool uses **2 databases** to find **an optimal match** for each biomass and technology.

One database consist of **technology criteria**, specific for each technology. The other database consist of **biomass characteristics**. The matching tool uses these databases to create an optimal match for each technology and biomass. This helps the user to find the most suitable combination to process biomass to certain end-products.

In the next slides one can see step by step how to select the conversion technologies and biomass, the matching overview and the details of the matches and no-matches.

Bio2Match tool is developed by BTG Biomass Technology Group and Wageningen University and Research. The tool is first released in S2Biom-project and upgraded further in MAGIC-project.

The tool is available at: http://magic-h2020.eu/bio2match-tool/

btg biomass technology group

Magic

WAGENINGEN UNIVERSITY & RESEARCH

Table of contents

Working principle of the tool

Getting started

Making the selection

Looking at Match overview

Details of the Match 1/2

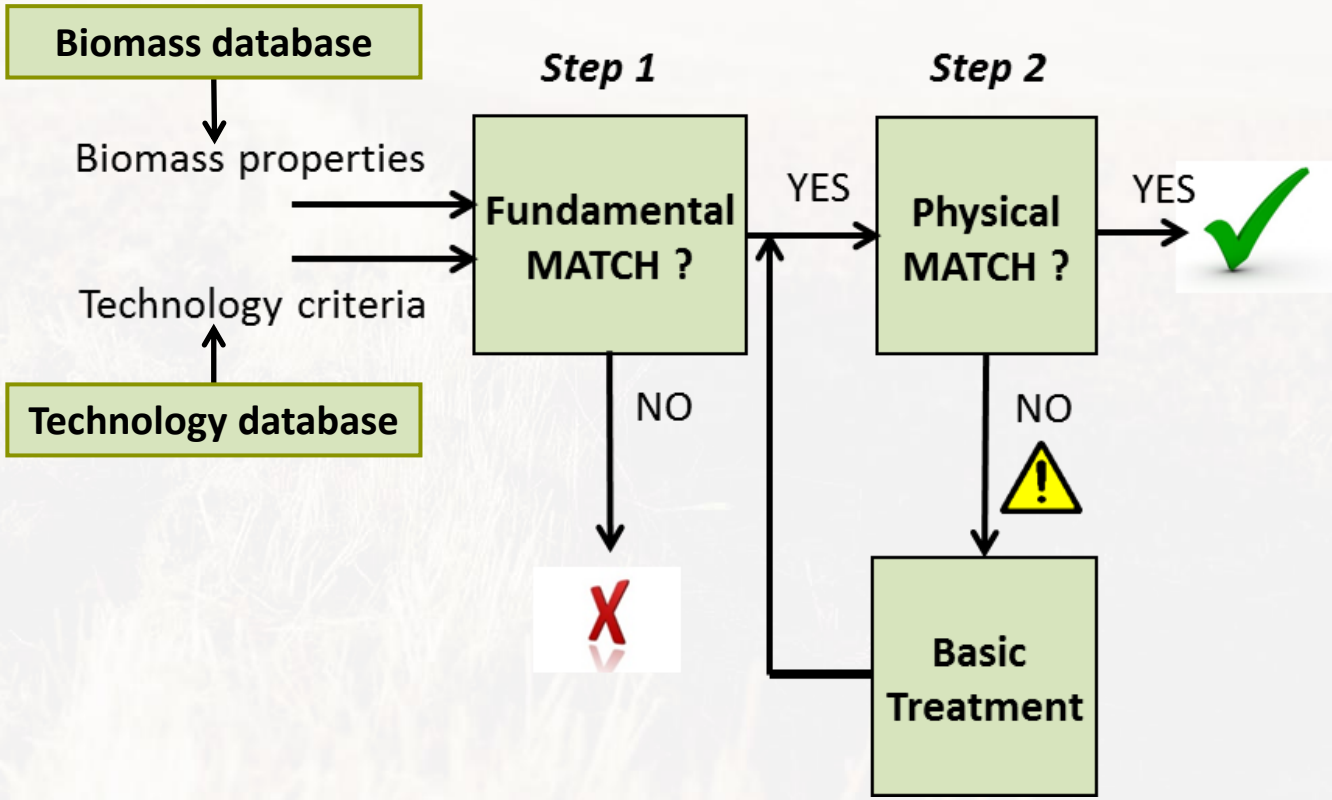
Details of the Match 2/2

More information about the matching criteria and the matches

Final remarks

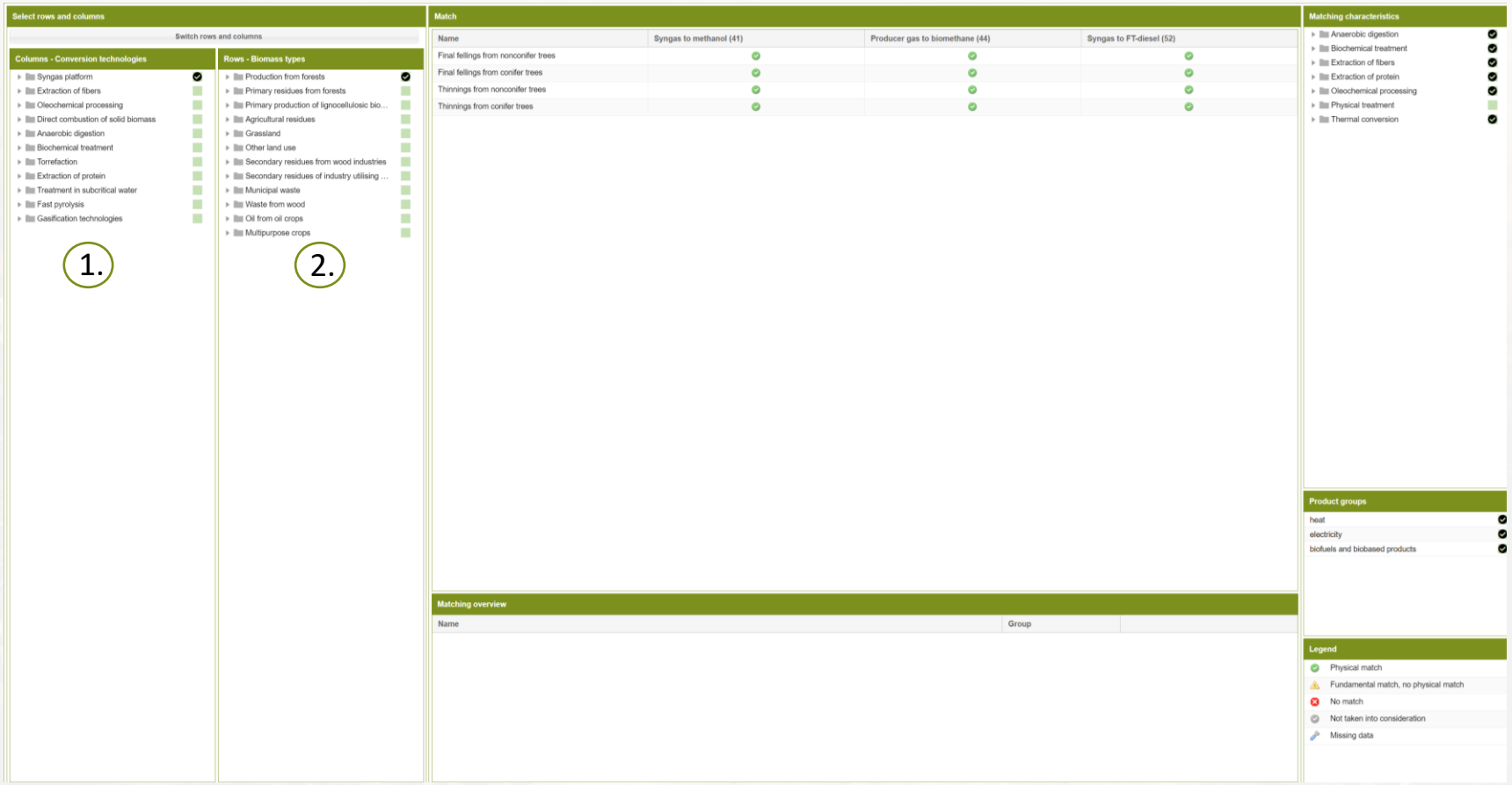
Working principle of the tool

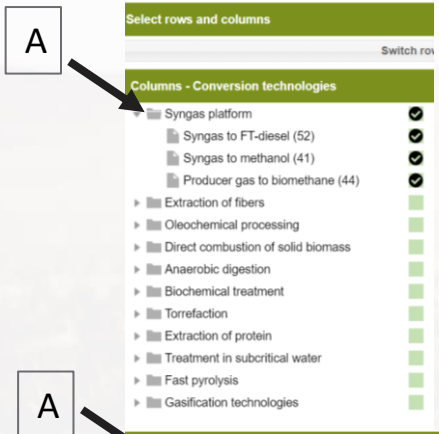
- The tool will use biomass properties and the technology criteria to make a match.
- If there is a fundamental match, the conversion can be carried out.
- In case there is no physical match a pre-treatment, such as drying, can be carried out to make the conversion possible.
- The tool allows to search and review several biomass types and conversion technologies at one glance.

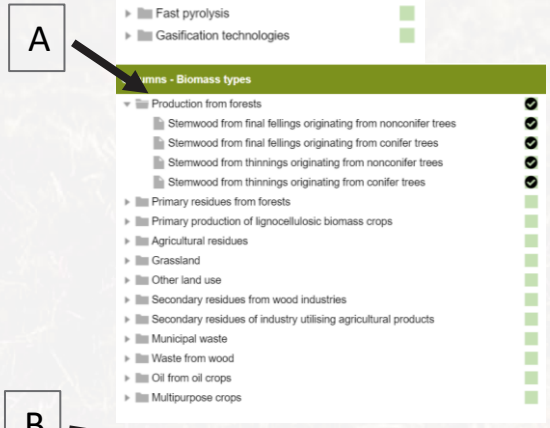


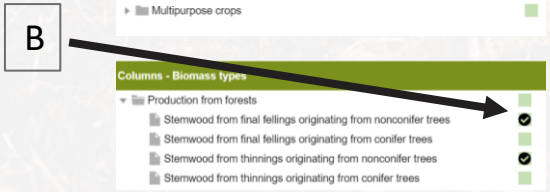
Getting started

Below is the tool window as user will see it when starting. On the most left are **Conversion technology** categories in the tool (1). Next to it are **Biomass types** (2).









Making the selection

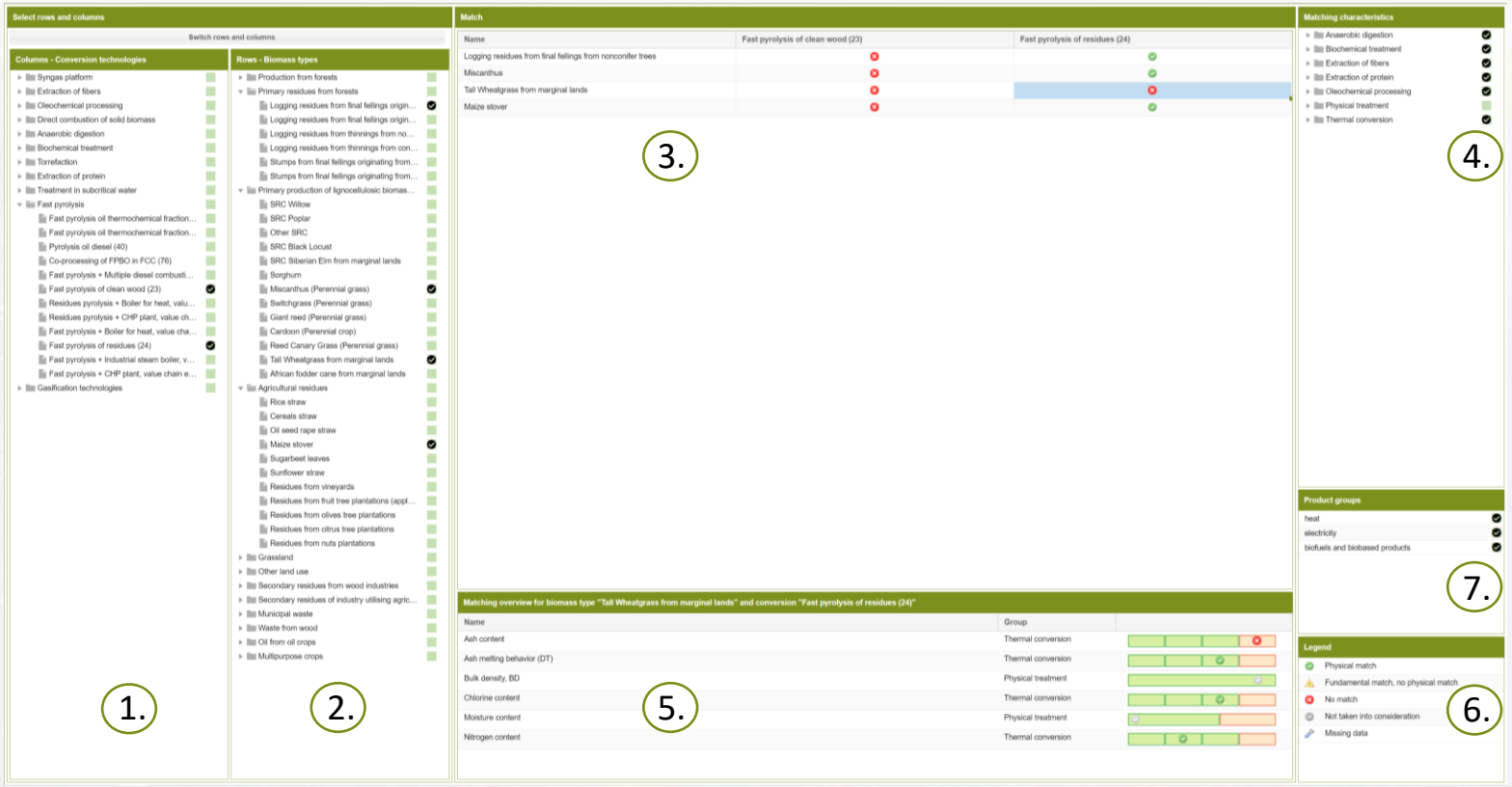
A) By clicking each group, one can see all the possible conversion technologies/biomass types under the category.

For example: under Syngas platform one can see three different conversion options. Under Production from forests, all this type of biomass in the database is shown.

B) One can select the whole group, like in the top two figures, or select only some of them for the comparison.

Looking at the Match overview

When one has selected the conversion technology and the biomass types of interest, the match is shown in the middle in the **Match** box (3). The green mark indicates **a match** and the red cross indicates **a no-match**.
The characteristics that are taken into account for the matching are shown in box (4). By default all of them, except *Physical treatment* is selected. This is explained in more detail in the next slide.
When one selects one of the **match**/**no-match** (box 3), **Matching overview** (5) shows an explanation.
The symbols used in the tool are shown in the **Legend** box (6). One can filter out their desired product in the **Product groups** box (7). This selection removes the conversion technologies from the selection that do not produce this product.



Details of the Match 1/2

The matching is taking into account the fundamental and physical properties of the biomass. Fundamental properties are properties that cannot be affected after harvesting these are, for example, ash content, ash melting behaviour, chlorine and nitrogen content. Physical properties are the density and moisture content, which can be influenced by a pre-treatment of the biomass. For example, to make too moist biomass suitable to be processed by drying.

In **Matching characteristics** (4), *Physical properties* is by default un-selected. This way the user always has the fundamental match shown. First the match/no-match concept is explained with this setting.

Match

Matching overview (5) shows all the criteria taken into account for the match. In the selected case the following fundamental properties constitute to the match:

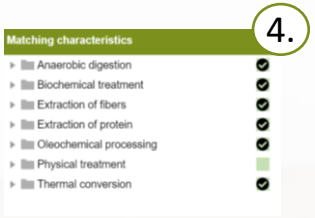
- Ash content
- Ash Melting behaviour (DT)
- Chlorine content
- Nitrogen content

The green marker appears in top of the green box (see black circle) for indication that the biomass properties are matching with the technology criteria in a specific range or class. These are explained in more detail on page 10.

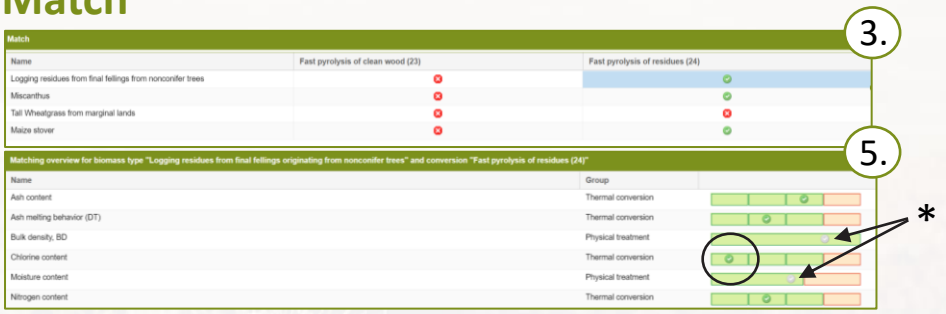
As *Physical properties* (*) *are* not selected in **Matching characteristics** (4), these are not taken into account and the marker is grey, as described in the **Legend**.

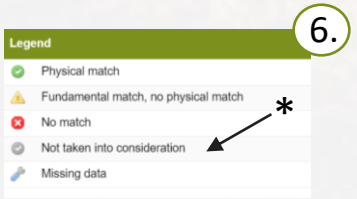
No-match

In this case, same properties are taken into account as for above. **Matching overview** (5) shows that the reason for excluding the biomass (*Tall wheatgrass from marginal lands*) is because the *Ash content* is too high. *Ash content* is a fundamental property and therefore it results in a no-match.

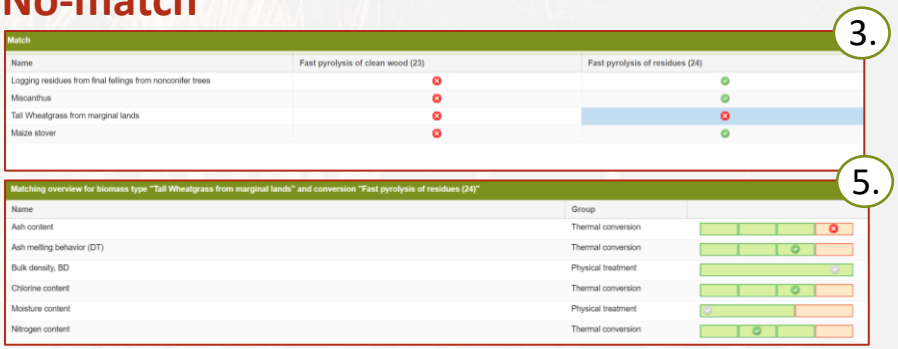


Match





No-match

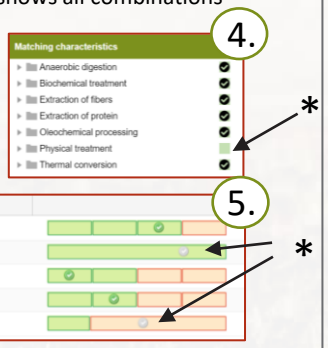


Details of the Match 2/2

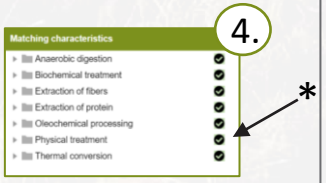
Here the difference between fundamental match and physical match is explained.

For this example, another technology (*Ethanol from lignocellulose*) is chosen in the **Conversion technology** (1), the biomass selection remains the same. As by default the *Physical properties* (*) in the **Matching characteristics** (4) is not selected. And the **Match** box (3) shows all combinations matching.

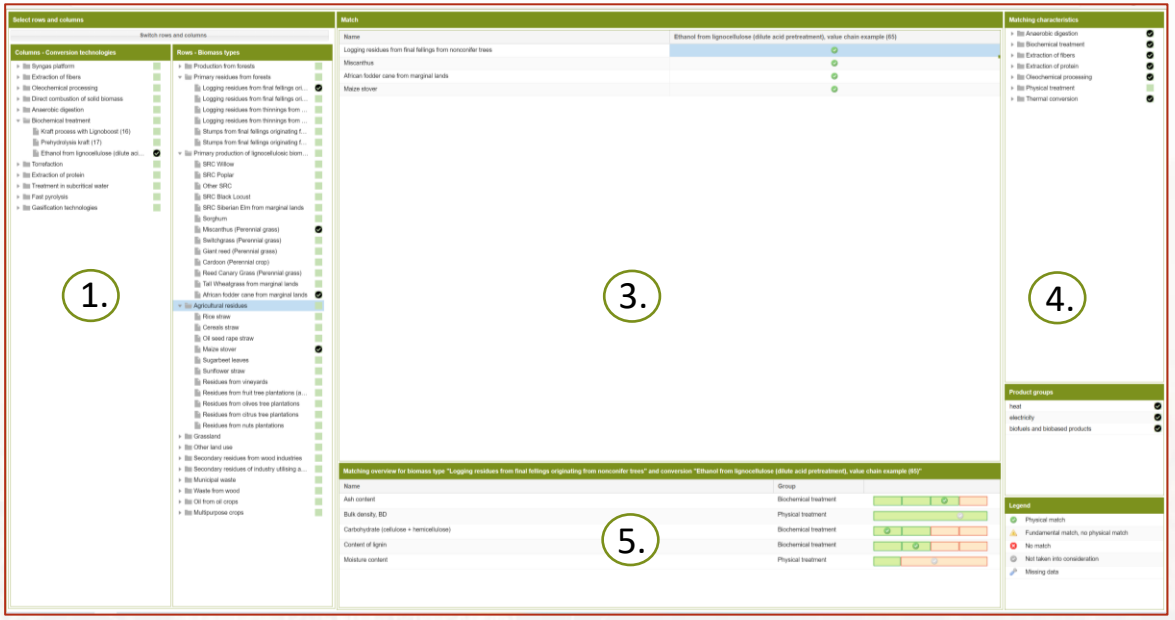
Matching overview (5) shows also that *Physical treatment* is grey (not taken into account).

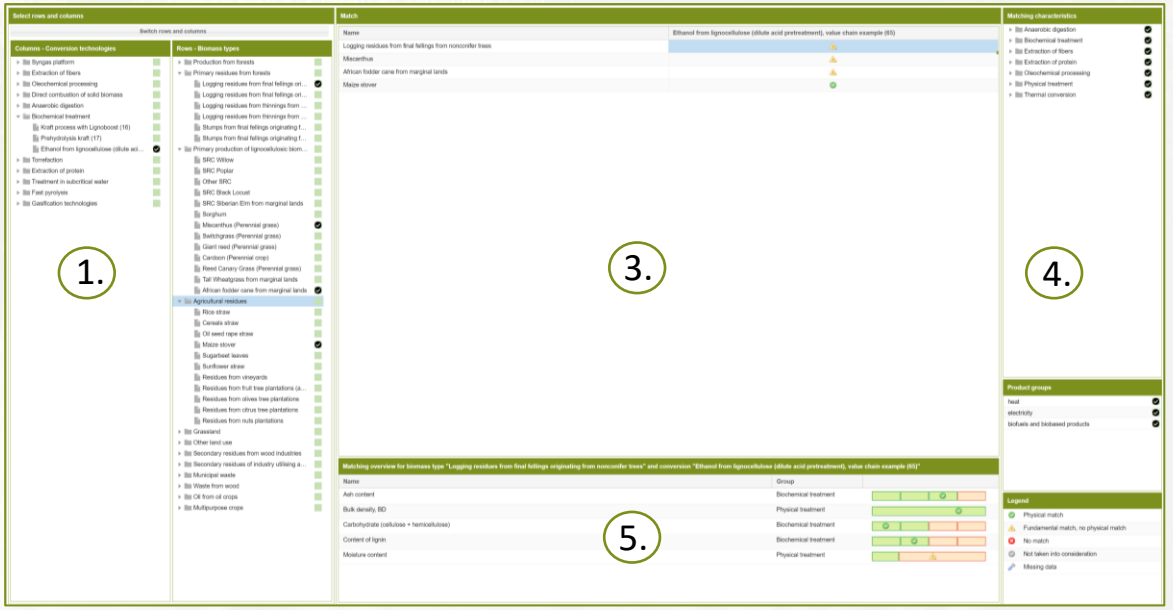


When selecting the *Physical properties* (*) in the **Matching characteristics** (4) one can see that the overview changes (see the figure on the right).



A triangle appears where a match was indicated in the **Match** box (3). ⚠ This indicates that fundamental match is possible, but physical match is not. The **Matching overview** (5) has changed now also. A grey marker for *Bulk density* has turned green (arrow a). For *Moisture content* the triangle has appeared (arrow b) meaning that it is too high and the biomass needs a pre-treatment (drying) and therefore, there is no physical match.





More information about the matching criteria and the matches

It is possible to get more insights from the tool on the matching criteria and biomass suitability for each conversion technology. This can be found in the **Matching overview** (5) box. By clicking the arrow pointed at (a), one can open a dropdown menu. By clicking *Columns*, one can select more information for the **Matching overview** (5) box.

In this example (**Matching overview** (5A)), the following are shown:

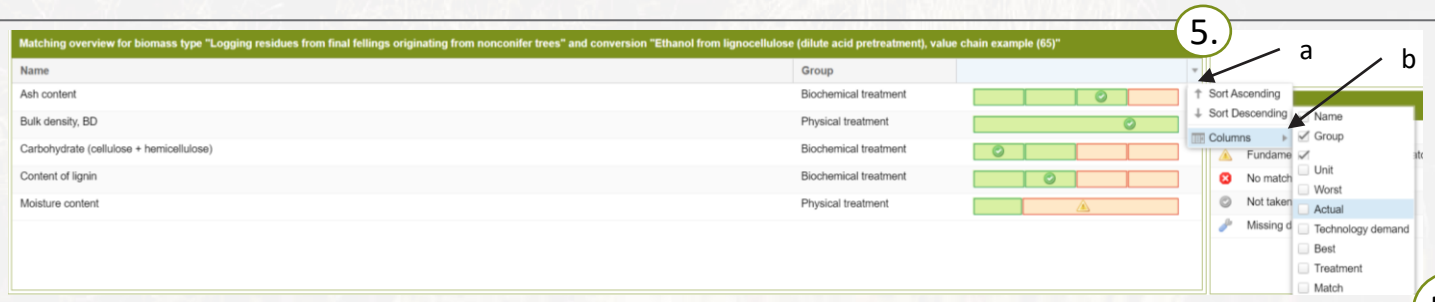
- *Unit*
  - Shows the units used for the data. If the data is classified, the ranges for each class are described. For example, *Ash content* is classified as follows: Class 1: ≥1w-% dry, Class 2: 1-3 1w-% dry, Class 3: 3-10 w-% dry, Class 4: >10 w-% dry.

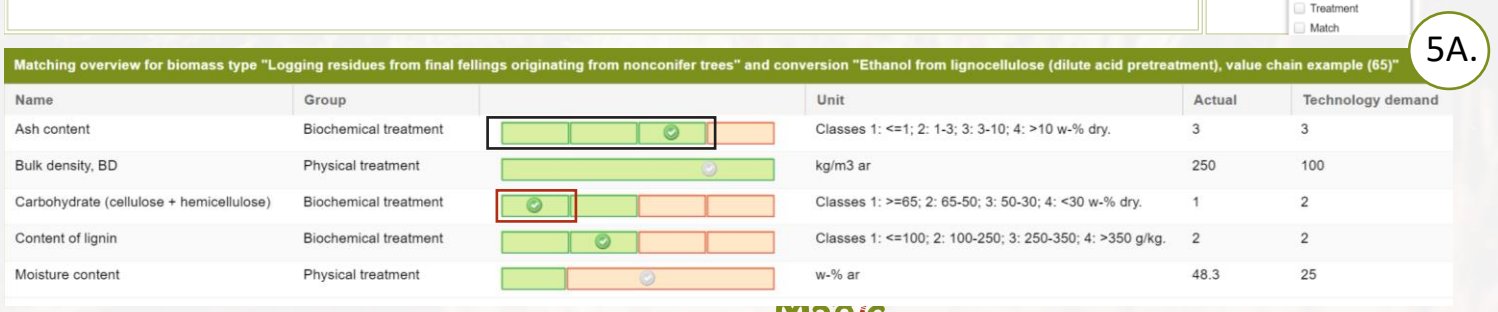
- *Actual*
  - Shows the actual property for the biomass. For example, *Bulk density, DB* is 250 kg/m^3 as received. If the criteria is classified, it shows the class the biomass belongs to. This is also indicated by the position of the green marker over the boxes. Please see the red box in *Carbohydrate (cellulose + hemicellulose)* group.

- *Technology demand*
  - Shows the requirement for the technology. For example, for *Bulk density, DB* this is 100 kg/m^3 as received. The number of green boxes shows the classes that the technology allows. Please see the black box over *Ash content* group.

The meaning of the other options (not shown) in the drop down menu are:

- *Best, Worst*
  - The best and worst-case values of the biomass properties.
- *Treatment*
  - The pre-treatment needed when physical match is not possible.
- *Match*
  - Shows the match or no-match for each characteristic.





Final remarks

- The tool is available on the MAGIC website: http://magic-h2020.eu/bio2match-tool/
- On this webpage a short tutorial for the tool is available.
- The biomass database and the technology database are downloadable on this webpage.
- Background photo by Siebe Warmoeskerken on Unsplash.