OSCAR Cover Crop and Living Mulch Toolbox

www.covercrops.eu

User Guide

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Introduction

The Cover Crop and Living Mulch Toolbox summarizes the results of the OSCAR European research project which focuses on developing sustainable Conservation Agriculture (CA) systems in different environments and increasing the diversity of cover crops and living mulches (subsidiary crops). The toolbox has been developed by the Organic Research Centre Elm Farm, UK together with the Technical University of Munich, Germany, who gave technical assistance and lead on the development of the cover crop database. All Partners of the OSCAR project contributed with their results.

One of the key aims of the Toolbox is to present results of screening trials aimed at identifying new legume species. The other activities are summarised, and references to all publications used in the development of the Toolbox are provided in this document. The Toolbox will help you to:

- Identify suitable cover crop and living mulch species, varieties and appropriate species mixtures.
- Access the best current practical advice about management issues.
- Identify economic considerations when planning cover crop and living mulch-based systems.

The Toolbox is presented as a series of web based tools to help improve knowledge and drive the use of CA practices and subsidiary cropping systems throughout Europe. The content draws on scientific literature, technical information and results from the main research element of the OSCAR project; coordinated field trials of cover crop and living mulch species in 12 different environments, ranging from boreal climates in Northern Europe to Mediterranean and tropical sub humid climates. The Toolbox also includes information from a series of screening trials, undertaken as part of OSCAR in two Mediterranean and one temperate environment, to test and identify novel species and genotypes for use as cover crops or living mulches.

The Toolbox provides tools for everyone; from farmers, scientists and advisors, to seed producers, plant breeders, NGOs, manufacturers of agricultural equipment and members of the general public.

The Toolbox consists of three main elements; a Wiki; a Decision Support Tool; and a Species Database. These three elements are outlined below along with hints and tips on how to make best use of them.

Accompanying the Toolbox the OSCAR Project Facebook page (https://www.facebook.com/The-OSCAR-Project-643571612380744/) has up to date information on related events, news items and links to relevant reports from other projects.
The OSCAR Cover Crop and Living Mulch Wiki

Figure 1: The Wiki main page

This OSCAR Wiki is an interactive user-fed knowledge source of regionally relevant information concerning leguminous and non-leguminous cover crop and living mulch species, machinery and farm case studies. Information can be in the form of text, images, videos and links to other relevant webpages.

Information included in this Wiki comes from a variety of sources including personal experience, advisory services, scientific literature, and from the experiments conducted in the OSCAR project. The Wiki is a living document that evolves through input from participants. It depends upon contributions from registered users modifying and adding new entries. The OSCAR Wiki can be accessed via the Cover Crop and Living Mulch Toolbox or directly here:

http://web3.wzw.tum.de/oscar/wiki/index.php/Main_Page

The Wiki was created using the open source software MediaWiki. To make edits to the Wiki or to add new information is easy. You need to register first and create an account, to do this simply click on the ‘create account’ tab at the top of the main page, fill in the required details and you are ready to start adding your contributions.

To get you started below are some instructions on how to edit the OSCAR Cover Crop and Living Mulch Wiki pages. There are also some help pages within the OSCAR Wiki and more help and information on the MediaWiki website https://www.mediawiki.org/wiki/MediaWiki.

The number one rule of wiki editing is to be bold. Go ahead - make changes. Other people can correct any mistakes you make, so have confidence, and give it a try!
How to edit the OSCAR Wiki

Register

1. Click on ‘Create account’.
2. Designate yourself a username + password.
3. Insert your email address.
4. Click on the link sent to your email address to confirm registration.

* NOTE: Some of the editing rights are reserved and therefore must be requested. Send requests (include details of your name and your chosen wiki username) to: bruce.p@organicresearchcentre.com

Once you are registered and logged in you can edit and add to existing page and create new pages.

Editing pages

1. Click the ‘edit’ at the top of the page.
2. Make changes to the text.
3. Click the ‘save’ button.

* IMPORTANT: Remember to save the page before navigating away from it to prevent losing the unsaved work.

* NOTE: All pages written in German, Spanish, French or Italian are translated versions of the main page written in English thus cannot be updated manually. In order to edit a page that is not written in English, it’s necessary to edit the English version first and then use the translation tool to update the translation (see ‘Translating a page’ pp. 8).
Creating a new page

To add a page to an existing section (e.g. Legumes):

1. Click ‘Legumes’ on the sidebar
2. Click ‘edit’ at the top right of the page
3. Type in code in this format *[[New page name]] e.g. *[[Alsike clover]]
4. Click ‘save page’
5. Return to the ‘Legumes page’ and select the new page link to begin creating the page.

Headings

==text== primary heading
===text=== sub-heading

Text formatting

Click ‘edit’ in the overhead bar.
Highlight text. Click on the icon I for italics or click the icon B to make the text bold. Alternatively simply insert the ‘’ or ‘’ around the text you wish to format as outlined below:

Italics “text”
Bold ”text”

How to view new changes to the page

If changes have occurred to the page since the last translation then this will appear at the top of the page. To view the changes click ‘changes’.

This will bring up a page showing the recent changes on the newer document on the right of the page and the older one on the left.
Adding images

* IMPORTANT: Before selecting a file please make sure that there are not any copyright issues.

If the image is your own then and you are willing to let others to use it please select ‘Creative Commons Attribution ShareAlike 3.0’.

Wikipedia images will have a Permission/Licensing section displayed when you click on the image which will let you know what licence (if any) is related to the image.

If you do not find any information on the license of the image do not use it.

If permission to use the file is granted then you may upload file using the ‘Upload file’ page located under the ‘Tools’ bar on the left hand side menu.

1. ‘Choose file’ to upload (Permitted file types: png, gif, jpg, jpeg)
2. Insert ‘Destination filename’ information.
   (The text typed in this box will be referenced when inserting the image into a page.)
3. Select licensing option by clicking the ‘Licensing’ drop down menu arrow.
4. Click ‘upload file’. This may take several minutes depending on the size of the image.

After uploading the file you can insert it into the page you are editing using the code below:

```
[[File:name of file | size of image px | thumb | positioning of image | text displayed at bottom of image]]
```
e.g. [[File:Vicia_villosa.jpeg | 400px | thumb | right]]

In this example no text will be displayed on the image.

To use the full size image use [[File:file]] e.g. [[File:Alsike_Clover.jpg]]

Click ‘save page’
Template for species pages

We recommend creating and saving the page in Word first using the code below. Then copy and paste the entire thing into the wiki page.

```xml
<languages/>
<translation>
=="latin name"==
[[File:|300px|thumb|right]]
=="Description"==
=="Distribution"==
=="Benefits as a subsidiary crop"==
=="Growers experiences"==
=="References"==
</translate>

Click ‘save page’

Link to another page
To link to another page you must place square brackets around the text of the page to be linked to [[page name]] e.g. to link to the Lucerne page you should type [[lucerne]]

Click ‘save page’

Redirect to the translated version of the page
To redirect to the translated version of the page use the code below:

```
#REDIRECT [[name of the page in English/EU code for target language]]
```
e.g. To link to the page for Birdsfoot trefoil that has translated in German type:
```
#REDIRECT [[Birdsfoot trefoil/de]]
```

* NOTE: For the Spanish version add es, for the French version add fr and the Italian version add it.

Click ‘save page’

If the link has worked you will see the name of the page you’ve redirected to in blue under ‘redirected page’, e.g.

If the link has failed the page name will be in red and you must return to the previous and check you’ve typed the link in correctly.
**Translating a page**

* NOTE: Rights to translate pages are reserved and therefore must be requested. Send requests to: bruce.p@organicresearchcentre.com

Once you received the permission, ‘edit’ the page you want to translate as described below:

At the very top of the page type:

```
<languages/>
<translate>
```

Then at the end of the body of text that requires translation type (after the heading References):  

```
</translate>
```

Click ‘save page’

When it loads the page up again it will say at the top of that page ‘Mark this page for translation’. If you click on this it takes to a page called ‘page translation’ in which the software automatically assigns units of translation, i.e. blocks of information to be translated in one go.

Scroll down to the end of the page and in the box called ‘Comma-separated list of priority language codes’ enter the languages you want the wiki to be in, i.e. type De, Es, Fr, It.

Also click the prevent translations to languages other than the priority languages box. Then you can select ‘Mark this version for translation’.

Click ‘save page’

Return to the page you would like to translate. Either click on the language you wish to translate the page into at top of the page or click on the ‘translate this page’ button and follow instructions below.

* NOTE: If you want to translate a page that has changed since the last translation session follow instructions in page 11 first.
Make sure the language you wish to translate into is correct. If it’s not then click on the language.

This will bring up this box. If the language you wish to translate the page into is written in blue then click on it.

If it’s not in the box search for it in the ‘Language search’ box and then select the language written in blue in the box underneath the search box.
You will get to a page like this one below. Click ‘edit’ on the section you want to translate.

This will bring up the translation box below. Simply type in your translation here:

Click ‘save translation’

Continue until you have translated and saved all the sections.
Translating a page that has changed since the last translation session

Go to the page and click on the ‘Marked for translation’ at the top of the page.

To continue on to translate the newly changed page click on the ‘Mark this page for translation’ at the bottom of the page.

This will bring up the ‘Page translation’ page. Simply use the sidebar to return to the recently changed page you wish to translate page and begin translation as explained in the ‘Translating a page section’ of this document.
The Decision Support Tool

This tool, aimed at farmers, researchers and other stakeholders, allows you to search our database for information on leguminous and non-leguminous cover crop and living mulch species throughout Europe. The Tool aims to assist with the decision making process and enables you to discover cover crop and living mulch species on the basis of characteristics that fit with your own site specific cropping systems.

The Tool is reached through the top menu bar of the Cover Crop and Living Mulch Toolbox.

Figure 2: The front page of the Decision Support Tool

When you Enter the Tool you are taken through to a page where you select your individual species requirements in relation to your location, soil type, priorities and intended use. This query then generates a set of plant profiles that fall within your specifications and allows you to compare the properties of different species.
At the top of the ‘select species requirements’ page you are asked to fill in the broad geographical region that you are interested in (All Regions; Northern, Central, Western or Eastern Europe; Northern or Southern Mediterranean). You can only pick one area so pick the one that best represents your location or if unsure you can run the search more than once with different locations.

Explanations of the Geographical Regions:

- Northern Europe: Scandinavia, Northern Britain, Baltics
- Western Europe: Rest of UK, Ireland, Western France, Northern Spain,
- Central Europe: Germany, Netherlands, Belgium, NE France, Switzerland, Austria, Czech republic, Slovenia, Western Poland, North-Western Spain, Western Hungary, Serbia
- Eastern Europe: Central and Eastern Poland, Slovakia, Hungary, Romania, Bosnia-Herzegovina (Eastern part), Moldova, Bulgaria Serbia, Ukraine, Belarus, Western Russia
- Northern Mediterranean: Northern Spain, Southern France Northern and central Italy, Croatia, Bosnia-Herzegovina (Western part)
- Southern Mediterranean: Southern Spain, Coastal Areas of Northern Africa, Israel, Lebanon, Syria and Turkey, Greece.

You are then asked to answer a series of questions relating to your specific species requirements. To get the best results try to pick out the features that are particularly important to you. The form can be filled in as many times as you want though, so you can go back and change your answers and create customised lists for different fields or different points in your rotation.
Figure 3: The select species requirements matrix

Each species in the database has been assigned a score for each of the requirements in the Tool. Based on your search criteria the scores are weighted and an overall score calculated by which the species in the database are ranked. The table below shows how the scores were assigned for each variable.
### Table 1: Scoring for species requirements

<table>
<thead>
<tr>
<th>Species Requirement</th>
<th>Desirable</th>
<th>Less important</th>
<th>Not required</th>
<th>How these variables are assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biomass</strong></td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
<td>The absolute biomass varies according to climate and seeding time. Where available the score is based on evaluation trials carried out in southern Germany in 2015. The plants were cut at the end of June.</td>
</tr>
<tr>
<td><strong>Weed suppression</strong></td>
<td>Good weed suppression</td>
<td>Some weed suppression</td>
<td>No weed suppression</td>
<td>The biomass of weed in g/m² per plot and the canopy density of the legumes were the criteria of the scoring of weed suppression. The density of canopy was weighted stronger, because the pressure of weed was very different in the field.</td>
</tr>
<tr>
<td><strong>N-supply ability</strong></td>
<td>Strong N fixation</td>
<td>Variable N fixation</td>
<td>Does not fix N</td>
<td>Legumes generally have high N-supply ability with variability depending on the species and most non-legumes do not fix nitrogen.</td>
</tr>
<tr>
<td><strong>N release rate</strong></td>
<td>Fast release (i.e. annual clovers)</td>
<td>Steady release</td>
<td>Slow release (i.e. grasses)</td>
<td>Speed of N release on termination of cover crop.</td>
</tr>
<tr>
<td><strong>Disease suppression</strong></td>
<td>Good disease suppression</td>
<td>Some disease suppression</td>
<td>No disease suppression</td>
<td>Species were scored highly if they were resistant to a wide range of diseases or the literature examined suggests that they are.</td>
</tr>
<tr>
<td><strong>Cold tolerance</strong></td>
<td>&lt; 0°C</td>
<td>0-5°C</td>
<td>&gt;5°C</td>
<td>Temperature that the species can tolerate and still remain alive and healthy.</td>
</tr>
<tr>
<td><strong>Adaption to sandy soils</strong></td>
<td>Does not grow in sandy soils</td>
<td>Can grow in sandy soils</td>
<td>Grows well in sandy soils</td>
<td>The assignment is based on the conditions, where the species is originated from and/or where it is usually cultivated, as well as existing longer term experience.</td>
</tr>
<tr>
<td><strong>Adaption to clay soils</strong></td>
<td>Does not grow in clay soils</td>
<td>Can grow in clay soils</td>
<td>Grows well in clay soils</td>
<td></td>
</tr>
<tr>
<td><strong>Rooting depth</strong></td>
<td>Main rooting zone at 0-20cm</td>
<td>21-50cm</td>
<td>&gt;50cm</td>
<td>Based on existing knowledge of the species or genus.</td>
</tr>
<tr>
<td><strong>Soil stabilisation</strong></td>
<td>Suitable for soil stabilisation</td>
<td>Some suitability for soil stabilisation</td>
<td>Not suitable for soil stabilisation</td>
<td>Improving soil aggregate stability and ground cover. Rapid germination and establishment, good lateral growth and/or extensive root system.</td>
</tr>
<tr>
<td><strong>Suitability as living mulch</strong></td>
<td>Grows well as a LM in all conditions</td>
<td>Grows well as a LM in limited conditions</td>
<td>Does not grow well as a LM</td>
<td>Low growing, rapid establishment, ability to grow with but not be too competitive compete with field crop.</td>
</tr>
<tr>
<td><strong>Suitability as cover crop</strong></td>
<td>Grows well as a CC in all conditions</td>
<td>Grows well as a CC in limited conditions</td>
<td>Does not grow well as a CC</td>
<td>Depend on the growers criteria - generally all species in the database have some suitability as a cover crop.</td>
</tr>
<tr>
<td><strong>Suitability as undersown crop</strong></td>
<td>Grows well as an US in all conditions</td>
<td>Grows well as an US in limited conditions</td>
<td>Does not grow well as a US</td>
<td>Similar to living mulch. Low growing, rapid establishment ability to grow with but not be too competitive compete with field crop.</td>
</tr>
<tr>
<td><strong>Suitability as whole season crop</strong></td>
<td>Grows well as a WS in all conditions</td>
<td>Grows well as a WS in limited conditions</td>
<td>Does not grow well as a WS</td>
<td>Ability to be sown and grown year round in most conditions - this attribute will vary with geographic location.</td>
</tr>
<tr>
<td><strong>Soil pH</strong></td>
<td>Tolerates high acidity</td>
<td>Tolerates a wide range of soil conditions</td>
<td>Tolerates basic soils</td>
<td>The assignment is based on the conditions, where the species is originated from and/or where it is usually cultivated, as well as existing longer term experience.</td>
</tr>
</tbody>
</table>
Once you are happy with your answers **submit your search** and you are taken to an output table with a list of species in the database ordered according to their relevance to your geographic location and specific requirements. The most interesting species appear at the top of the list and the least interesting at the bottom. The most widely English common name and the scientific name of each species is shown along with the overall weighted score for each species. The search will return only those species which are commercially available or those with a high likelihood of being available commercially in the future.

**Species weighting:**

For each species and each of the above criteria, a score is included in the species table, which indicates e.g. potential for biomass production, the cold tolerance etc. From these data and the weighting factors chosen by the user, an index is calculated for each species, which indicates its relevance for the requirements of the user. The simplest possibility for calculation this index, which is currently in use, is the sum of the weighted scores:

\[ I_{\text{tot}} = I_{\text{biomass}} \times W_{\text{biomass}} + I_{\text{weed}} \times W_{\text{weed}} \ldots \]

Where \( I_{\text{tot}} \) is the overall index of the species, \( I_{\text{biomass}} \) is the score of the species for biomass production, \( W_{\text{biomass}} \) that for biomass production, etc. \( W_{\text{biomass}} \) and \( W_{\text{weed}} \) are the respective weighting factors chosen by the user. The output is a table where the species are ordered by their relevance, as indicated by the index \( I_{\text{tot}} \).

Once you have decided on the species that you are interested in you can click on the **details** tab on the right hand side of the table to give you more information on each individual species.

**The Decision Support Tool Species Details**

The details for each species include:

1. The scientific name, common synonyms, common names in English and German and a link to the Wiki entry for this species (where available).

2. Uses and cultivation – a synthesis of known information relating to the species use in agricultural systems and its geographical distribution both as a native and a cultivated plant.

3. Discussion of evaluation results – a summary of the key results from the screening trials carried out during the OSCAR project and where available a link to the cover crop database for more information on screening trials, trial reports and accession testing.

4. A summary table with scores for the most important characteristics.

A full reference list for all the information included in the species details is available at the end of this user guide.
The Subsidiary Crop Database

This interactive database allows you to search for information on leguminous and non-leguminous cover crop and living mulch species throughout Europe. It includes detailed information on new species and accessions trialled during the OSCAR project screening programme. You can search for information on species by scientific name, or by the common name in either English or German.

![List of Species](image)

**Figure 4: List of scientific names in the subsidiary crop database**

Choose an option from the menu on the left hand side of the page, you will then be taken to a list of the species in the database either as scientific names, English or German common names. The list also contains the most important synonyms of the scientific and common names. To view more information on a single species select it from the list and then click ‘View Details’.

**The Database Species Details**

In addition to the above details the database entry includes:

1. A botanical description of the species to highlight key identification features, plant morphology and growth habit, habitat preferences and distribution in the wild.

2. Discussion of evaluation results – a summary of the key results from the screening trials carried out during the OSCAR project.

3. Evaluation trials table – a list of all the evaluation trials carried out including the trial location and a link to download any relevant trial reports.

4. Evaluation summary – this table provides the evaluation results in the form of a table. Each species is scored according to various different attributes.

5. Details of the results of accession screening where available.
## Abbreviations and Scores

Generally a score of ‘1’ means weak expression of the respective plant characteristic and a score of ‘9’ strong expression. All other values are intermediate. We report scores, not absolute values (e.g. biomass in t/ha), because these values vary considerably according to the environment, but the ranking among species is mostly similar over a wide range of conditions. Species which were not part of the screening trials were assigned sores on the basis of existing knowledge and relevant literature.

<table>
<thead>
<tr>
<th>Abbr.</th>
<th>Explanation</th>
<th>Scoring 1</th>
<th>Scoring 9</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMA</td>
<td>Biomass production</td>
<td>Low</td>
<td>high</td>
<td>The absolute biomass varies according to climate and seeding time. Where available the score is based on evaluation trials carried out in in southern Germany in 2015. The plants were cut at the end of June.</td>
</tr>
<tr>
<td>DDS</td>
<td>Name of observed diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DET</td>
<td>Simultaneousness of flowering</td>
<td>Flowers successively over a longer period</td>
<td>Flowering simultaneous</td>
<td>In this screening three different scores (1, 5 and 9) were given for the evaluation of determinedness of the plants. Some plants flowered and produced pods at the same time or started flowering again after pod formation. The evaluation notes before harvesting helped to make a decision.</td>
</tr>
<tr>
<td>DIS</td>
<td>Observed diseases</td>
<td>no diseases</td>
<td>strongly affected</td>
<td></td>
</tr>
<tr>
<td>EST</td>
<td>Establishment</td>
<td>slow</td>
<td>fast</td>
<td>To assign the scores for establishment the analysis of photographic data material during the screening was used.</td>
</tr>
<tr>
<td>FLO</td>
<td>Flowering time</td>
<td>early</td>
<td>late</td>
<td>The score is based on a visual assessment during flowering. Flowering time varies geographically.</td>
</tr>
<tr>
<td>FRD</td>
<td>Damage on leaves on surviving plants after frost</td>
<td>low</td>
<td>high</td>
<td>This score was assigned visually in spring.</td>
</tr>
<tr>
<td>FRM</td>
<td>Mortality during frost periods</td>
<td>high</td>
<td>low</td>
<td>This score was assigned visually in spring.</td>
</tr>
<tr>
<td>GHC</td>
<td>Growth habit in conditions of competition</td>
<td>erectophile</td>
<td>planophile</td>
<td></td>
</tr>
<tr>
<td>GHI</td>
<td>Growth habit in absence of competition</td>
<td>erectophile</td>
<td>planophile</td>
<td></td>
</tr>
<tr>
<td>HIG</td>
<td>Canopy height</td>
<td>low</td>
<td>high</td>
<td>Where available the score is based on evaluation trials carried out in in southern Germany in 2015. The absolute canopy height may vary widely according to the environment.</td>
</tr>
<tr>
<td>LOD</td>
<td>Tendency to lodging or need of support</td>
<td>lodging or depending on support</td>
<td>self-sustaining</td>
<td>The score was given shortly before harvesting by visual assignment.</td>
</tr>
<tr>
<td>LSZ</td>
<td>Leaf size</td>
<td>small</td>
<td>large</td>
<td></td>
</tr>
<tr>
<td>NOD</td>
<td>Nodulation</td>
<td>no nodulation if cultivated outside of original area</td>
<td>good nodulation</td>
<td></td>
</tr>
<tr>
<td>Persistence</td>
<td>only one year</td>
<td>good persistence over several years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------</td>
<td>-------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RIP</td>
<td>Ripening time</td>
<td>early, late</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDA</td>
<td>Seed availability</td>
<td>difficult, easy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHA</td>
<td>Seed harvestability</td>
<td>difficult, Easy to harvest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPR</td>
<td>Seed production</td>
<td>low, high</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSH</td>
<td>Seed shattering</td>
<td>strong tendency to shattering, good seed retainance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSP</td>
<td>Seed supplier</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSZ</td>
<td>Seed size</td>
<td>small, large</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STD</td>
<td>Stem diameter</td>
<td>fine, course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIL</td>
<td>Density of tillers/lateral stems</td>
<td>few, many</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VER</td>
<td>Vernalisation need</td>
<td>needs, no vernalisation need</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disease susceptibility</td>
<td>strongly affected, no diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tillering</td>
<td>Few, many</td>
<td>Density of tillers/ lateral stems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stem diameter</td>
<td>thin, thick</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weed suppression</td>
<td>low, high</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The date of harvesting is used to assign the scores of Ripening Time. It was started with harvesting when over 80% of the seed was ripe. The absolute flowering time varies according to climate and seeding time. Where available the score is based on evaluation trials carried out in southern Germany in 2015. The absolute seeding may vary widely according to the environment.

The score of harvestability depends on problems by harvesting: lodging, very low canopy height, unequally ripening and a strong tendency of seed shattering. The last two characteristics are more important to assign the scores of seed harvestability. Seed shattering was evaluated most weighted, because it is the most decisive factor for the amount of seed yields.

Where available the score is based on evaluation trials carried out in in southern Germany in 2015. The absolute level of seed production may vary widely according to the environment.

The score was given shortly before harvesting by visual assignment.

Where available the score is based on evaluation trials carried out in in southern Germany in 2015. The absolute level of seed production may vary widely according to the environment.

The biomass of weed in g/m² per plot and the canopy density of the legumes were the criteria of the scoring of weed suppression. The density of canopy was weighted stronger, because the pressure of weed was very different in the field.

Table 2: Abbreviations and Scores
Results on species accessions screened during the trials are then shown in a separate table at the bottom of the page. A full reference list for all the information included in the species details is available at the end of this user guide.
References


