

DASoftware User's Manual



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1. Introduction

DASoftware is a utility software to handle data saved by the DA Meter device. DASoftware provides charts and statistics on the data.

- Imports multiple files created by DA meter into user friendly formats
- Provides charts and statistics on the data created by DA meter
- Provide options to input user-defined Cultivars, Blocks, Rows and Plots.
- Exports data into comma-separated values (CSV) files that can be imported in Excel
- Graphs and charts can be individually saved as images

The DASoftware does not take into consideration the specific situations under which the data was acquired. It is therefore to be used for educational purposes only, as an aid to the use of the DA Meter. DASoftware does not replace the personal judgement of the grower or farm manager.

DASoftware was developed by Instruments & Data Tools Pty Ltd, with funding from the Horticulture Innovation Fund GA-F692259482, "DA Meter software development".

DASoftware has been developed using Qt modules (<https://www.qt.io>) which are licensed under a GNU Lesser General Public License version 3 (LGPLv3). DASoftware also uses QCustomPlot (<https://www.qcustomplot.com>), licensed under the GNU General Public License version 3 (GPLv3).

2. Installation and setup

DASoftware is a portable windows application and requires no installation. However, ensure that the following files/folders are present in the application directory:

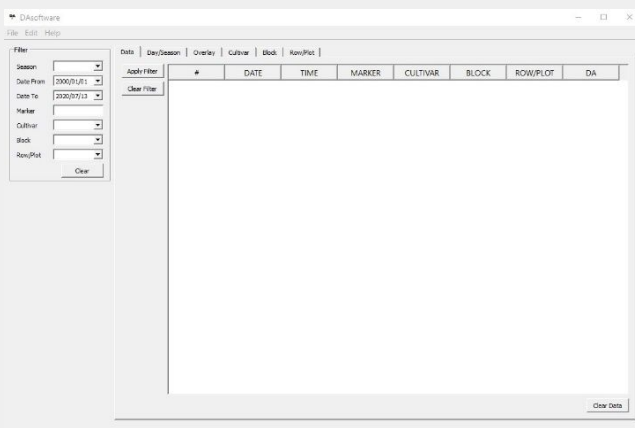
- DASoftware.exe
- Qcustomplot2.dll
- Qt5Core.dll
- Qt5Gui.dll
- Qt5PrintSupport.dll
- Qt5Widgets.dll
- vc_redist.x64.exe
- platforms/qwindows.dll

These files should have been provided with the application. On first use, it will likely be required to run the Microsoft Visual C++ Redistributable for Visual Studio 2015, 2017 and 2019 package (vc_redist.x64.exe). The Visual C++ Redistributable package only needs to be run once, and it can be deleted afterwards.

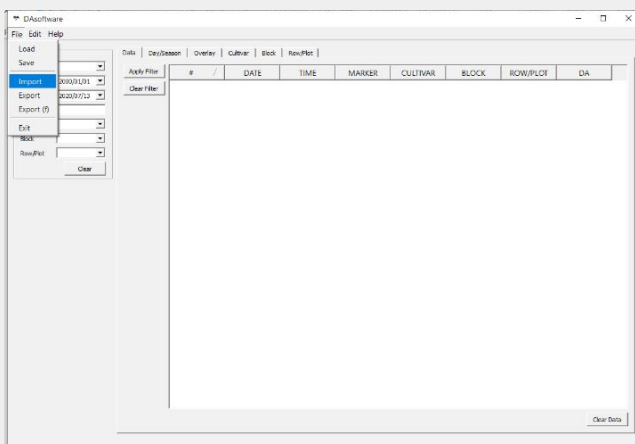
The Visual C++ Redistributable package may also be downloaded from Microsoft:
<https://support.microsoft.com/en-us/help/2977003/the-latest-supported-visual-c-downloads>.

3. Getting started

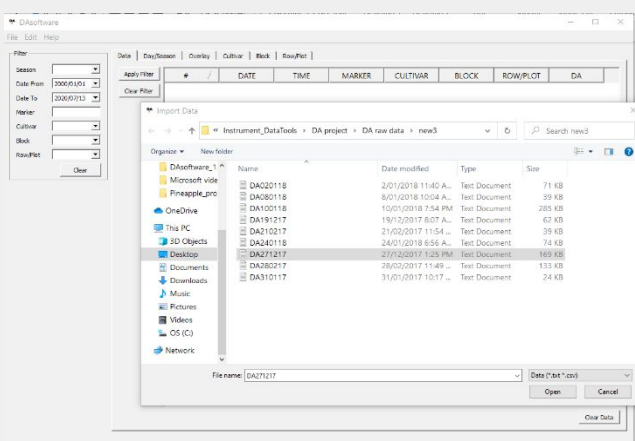
When you run the DASoftware.exe file you will see this window.

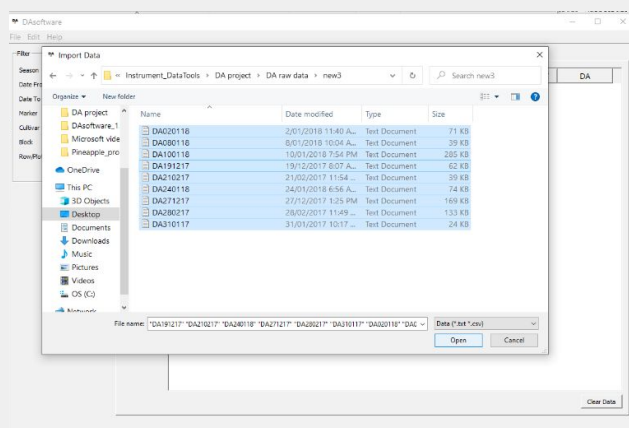


The menu bar displays File, Edit and Help. You use the menu to give instructions to the software. To view the DA meter data, you need to click on **File** and select **Import** from the drop-down menu.



Choose the DA meter text file from the correct folder and click Open.



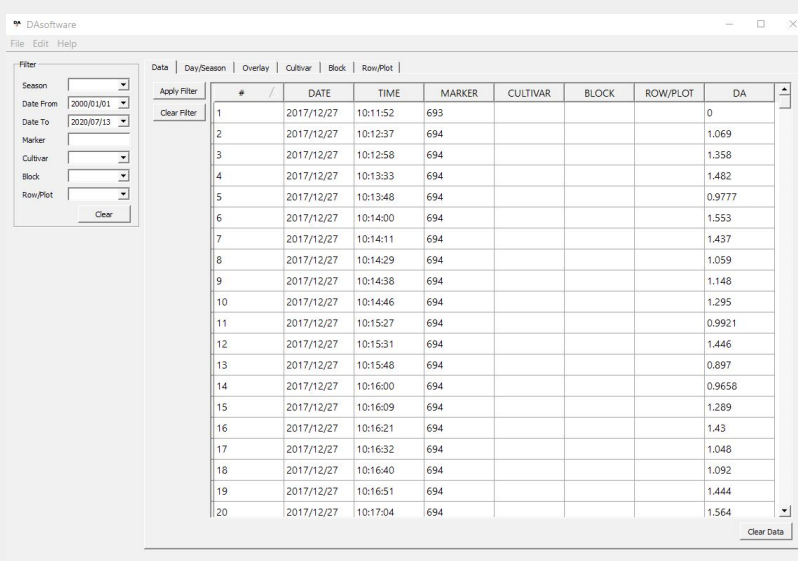


You can also choose multiple files to view. To select individual files hold the CTRL button while selecting files. To select all files in a folder use CTRL+A.

After the DA Meter data has been imported into DASoftware, the Data table will be populated as shown in the next figure. DASoftware automatically fills cells with information imported from DA meter file(s).

Note that if there are any duplicate data, a warning will be displayed and an option will be provided to remove the duplicates. A check for duplicate data can be performed by going to **Edit→Check Duplicates**.

The **Data** module contains the following headers: number of entries #, **DATE**, **TIME**, **MARKER**, **CULTIVAR**, **BLOCK**, **ROW/PLOT** and **DA** values.



#	DATE	TIME	MARKER	CULTIVAR	BLOCK	ROW/PLOT	DA
1	2017/12/27	10:11:52	693				0
2	2017/12/27	10:12:37	694				1.069
3	2017/12/27	10:12:58	694				1.358
4	2017/12/27	10:13:33	694				1.482
5	2017/12/27	10:13:48	694				0.9777
6	2017/12/27	10:14:00	694				1.553
7	2017/12/27	10:14:11	694				1.437
8	2017/12/27	10:14:29	694				1.059
9	2017/12/27	10:14:38	694				1.148
10	2017/12/27	10:14:46	694				1.295
11	2017/12/27	10:15:27	694				0.9921
12	2017/12/27	10:15:31	694				1.446
13	2017/12/27	10:15:48	694				0.897
14	2017/12/27	10:16:00	694				0.9658
15	2017/12/27	10:16:09	694				1.289
16	2017/12/27	10:16:21	694				1.43
17	2017/12/27	10:16:32	694				1.048
18	2017/12/27	10:16:40	694				1.092
19	2017/12/27	10:16:51	694				1.444
20	2017/12/27	10:17:04	694				1.564

The DA data may be sorted by ascending or descending order by clicking the column headings. Data may be selected simply by left-clicking the cells. Multiple cells can be selected by left-clicking and dragging the mouse, holding CTRL to select individual cells, or holding SHIFT to select groups

of cells. Left-clicking the small box left of the data will select the entire row, and left-clicking the small box left of the column headings will select the entire table.

#	DATE	TIME
1	2018/01/02	10:06:51
2	2018/01/02	10:07:39
3	2018/01/02	10:08:01
4	2018/01/02	10:08:30
5	2018/01/02	10:08:43
6	2018/01/02	10:08:52
7	2018/01/02	10:09:01
8	2018/01/02	10:09:24
9	2018/01/02	10:09:35
10	2018/01/02	10:09:45
11	2018/01/02	10:09:57
12	2018/01/02	10:10:08
13	2018/01/02	10:10:16
14	2018/01/02	10:10:26
15	2018/01/02	10:10:37
16	2018/01/02	10:10:48
17	2018/01/02	10:10:58
18	2018/01/02	10:11:05

This example shows the ordering by number of entries #.

Data can be viewed by clicking and dragging the scroll bars to the right and bottom of the table, and/or by using the mouse wheel to scroll vertically. The currently loaded data may be cleared from the application by pressing the **Clear Data** button. Note that data hidden by filters (see section 3.3) will be cleared also. Data can only be cleared from within the **Data** module window.

Except for the **CULTIVAR**, **BLOCK**, and **ROW/PLOT** cells, the data in the table is read-only and cannot be modified. On first import, the **CULTIVAR**, **BLOCK**, and **ROW/PLOT** cells will be empty and the user must enter the necessary data.

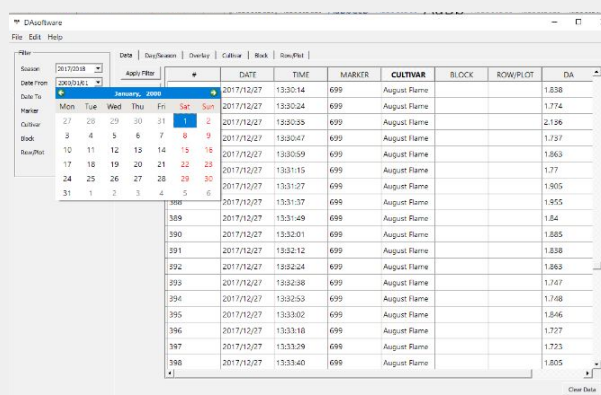
Data may be entered into the **CULTIVAR**, **BLOCK**, or **ROW/PLOT** cells by double clicking the cell. Data can be copy and pasted by pressing CTRL-C and CTRL-V, respectively. Multiple cells can be selected for copy/pasting. Changes made to the table data can be undone and redone by pressing CTRL+Z and CTRL+Y, respectively.

Cultivar, Block, and Row/Plot entries that are invalid (for an explanation of this see section xx) will cause the cell to be highlighted red. A valid entry may be entered into the cell by double clicking it and selecting a Cultivar, Block, or Row/Plot from the drop down menu to the right.

4. Filtering the data

The **Filter** functions on the left hand side of the panel can be used to select specific data based on a range of variables and their values. Data can be filtered according to:

- **Season.** A season is defined as beginning on the 1st of July, and ending on the 30th of June the following year. Selecting a season will



#	DATE	TIME	MARKER	CULTIVAR	BLOCK	ROW/PLOT	DA
3069	2017/01/31	11:17:20					
3068	2017/01/31	11:17:04					
3067	2017/01/31	11:16:49					
3066	2017/01/31	11:16:33					
3065	2017/01/31	11:16:15					
3064	2017/01/31	11:15:55					
3063	2017/01/31	11:15:39					
3062	2017/01/31	11:15:21					
3061	2017/01/31	11:14:57					
3060	2017/01/31	11:14:38					
3059	2017/01/31	11:14:23					
3058	2017/01/31	11:14:03					
3057	2017/01/31	11:13:45					
3056	2017/01/31	11:13:31					
3055	2017/01/31	11:13:14					
3054	2017/01/31	11:12:58					
3053	2017/01/31	11:12:46					
3052	2017/01/31	11:12:34					

automatically change the Date From and Date To filters accordingly.

- **Date from/Date to** can also be changed manually by typing the date or by selecting the arrow to the right of the field, which will display an interactable calendar for the user
- The **Marker** field allows users to filter the table data by the marker id, as recorded in the DA Meter. Note that if no marker was selected at the time of the measurement, the system will display “-1”.
- The **Cultivar**, **Block**, and **Row/Plot** fields allow users to filter for the Cultivar, Block, and/or Row/Plot used for the measurement. These are the fields that can be edited by the user to specify variety and location of the crop, as we will see in the next section.

The filters can be applied to the table data by clicking **Apply Filter** and removed by clicking **Clear Filter**. The filter settings themselves can be cleared by clicking **Clear** in the **Filter** box to the left. Doing so will clear the filter fields and set the date ranges from 01/01/2000 to the current date. Note that this will not remove the filter from the table data, and that the **Clear Filter** button must be pressed to return the unfiltered data (however, clearing the filter fields and then pressing **Apply Filter** will have the same result).

The filters can be used in combination to show only the table data that is of interest. For example, the next figure shows table data that has been filtered to display entries of the 2017/2018 season corresponding to the marker id 714.

Filter

Season: 2017/2018

Date From: 2000/01/01

Date To: 2020/07/14

Marker: 714

Cultivar:

Block:

Row/Plot:

Clear

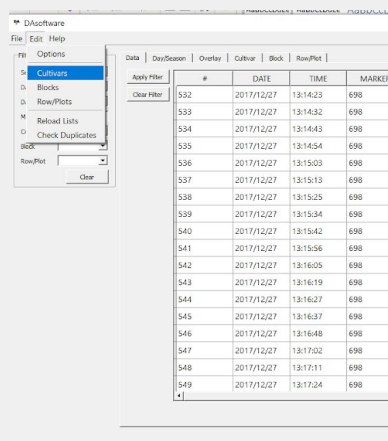
Data | Day/Season | Overlay | Cultivar | Block | Row/Plot |

#	DATE	TIME	MARKER	C
259	2018/01/10	08:10:19	714	
260	2018/01/10	08:10:25	714	
261	2018/01/10	08:10:32	714	
262	2018/01/10	08:10:50	714	
263	2018/01/10	08:11:14	714	
264	2018/01/10	08:11:19	714	
265	2018/01/10	08:11:24	714	
266	2018/01/10	08:11:32	714	
267	2018/01/10	08:11:37	714	
268	2018/01/10	08:11:46	714	
269	2018/01/10	08:11:55	714	
270	2018/01/10	08:12:00	714	
271	2018/01/10	08:12:05	714	
272	2018/01/10	08:12:10	714	
273	2018/01/10	08:12:15	714	
274	2018/01/10	08:12:23	714	
275	2018/01/10	08:12:29	714	
276	2018/01/10	08:12:36	714	

5. CULTIVAR, BLOCK and ROW/PLOT info entry

The **Cultivar**, **Block**, and **Row/Plot** fields are the only fields that can be edited by the users. They allow users to label the data with the specific information of their varieties and locations.

The information about Cultivar, Block, and Row/Plot needs to be predefined by the user. For instance cultivar can be entered on the menu bar display by selecting **Edit → Cultivars**. A new window will appear where Cultivar can be **Added**, **Edited**, **Deleted** or **Reset**.



New entries may be added to the list by clicking on **Add**. The order of valid entries in the list may be changed by selecting the entry and clicking either \uparrow or \downarrow . An entry may be edited by selecting it in the list, and pressing **Edit**, or deleted by pressing **Delete**. Clicking **Reset** will undo changes made since opening the list window. To apply changes made to the list, press **OK**, and to discard changes, press **Cancel**.

The lists are stored as regular plain text files and are located in the user's local AppData directory by default (e.g. C:/Users/[user_name]/AppData/Local/DAsoftware). The location of the stored list files can be changed by going to **Edit → Options** and specifying the paths of Cultivar, Block, and Row/Plot list files.

If the lists are modified outside of DAsoftware while the application is running, then the lists can be refreshed by going to **Edit → Reload Lists**.

6. Saving and loading data

At any point during data entry you can save your project. This will enable all custom information on Cultivar, Block, and Row/Plot to be saved along with your data.

The data can be saved as a DAT binary file, by going to **File → Save**. A window will display prompting the user to specify a directory and filename for saving. The structured binary file is intended for storing the database, and not for editing outside of DAsoftware.

The binary file can be reloaded into DAsoftware via **File → Load**. A window will prompt the user to browse to, and select the data files to import. Multiple files may be imported by holding *CTRL* to select individual files, or *SHIFT* to select groups of files. Note that if there is any duplicate data, a warning will be displayed



and an option will be provided to remove the duplicate data. A check for duplicate data can be performed by going to **Edit → Check Duplicates**.

7. Exporting data

Data saved as a DAT file cannot be opened with another software. If you wish to export the data as a spreadsheet file (which for instance can be opened in Microsoft Excel), you can choose to export the data. With this option, the data may be exported in a comma-delimited format as a CSV file by going to **File → Export**.

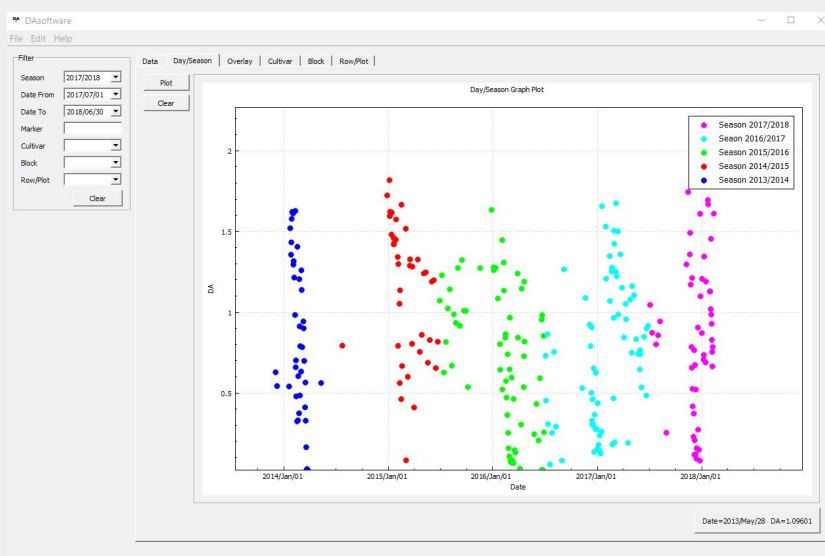
A window will display prompting the user to specify a directory and filename for saving. CSV Files can be opened in Microsoft Excel if required, however if the data is altered and saved in Excel, it may become incompatible with DASoftware and re-importing the data could fail.

Filtered data can also be exported by going to **File → Export (f)**. A window will display prompting the user to specify a directory and filename for saving. Please keep in mind that the data to be exported with **Export (f)** is retrieved from the current filter settings in the Filter box, and NOT the data currently tabulated in the Data module.

8. Plotting data

Once the relevant information is entered you can create plots and charts of your data. The **Day/Season, Overlay, Cultivar, Block, and Row/Plot** modules are used for plotting and visualising the DA Meter measured data.

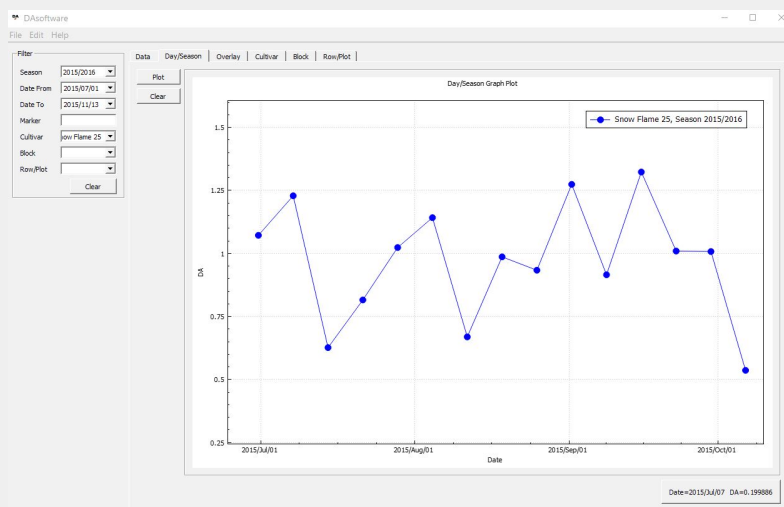
Data is plotted by pressing the **Plot** button. The **Filter** box is used to specify the data to plot. If no data is available for the current filter settings, a warning will be displayed. Please keep in mind that the data to be plotted is retrieved from the current filter settings in the **Filter** box, and NOT the data currently tabulated in the **Data** module.



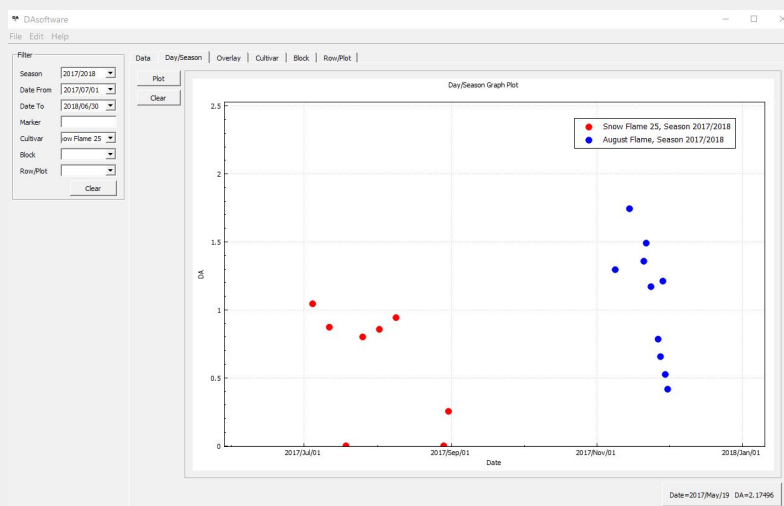
Day/Season plots

The **Day/Season** module will plot the DA Meter data (averaged per day) versus the date on the horizontal axis. This function is typically used to plot DA data in a single season. If you want to compare data from different seasons, use the **Overlay** module.

Using the **Filter** box on the right hand side, you can select the season, date period, Cultivar, Block or Row/Plot (by choosing the dates on **Dates From** and **Date To**) over which the DA can be plotted. In any case the DA data are the average of one day, so that if only a single date has been selected, the chart will display a single point.



Every time you change the settings in the **Filter** box and press the **Plot** button, a new line plot will be generated. For instance, to plot two or more DA values over the selected period as a function of various **Cultivar** (or **Block** or **Row/Plot**), choose another **Cultivar** from the **Filter** section with **Cultivar** (or **Block** or **Row/Plot**) selections and press **Plot**.



If you want to create a new plot and discard the one already existing you need to press the **Clear** button first, before plotting new data.

Overlay plots

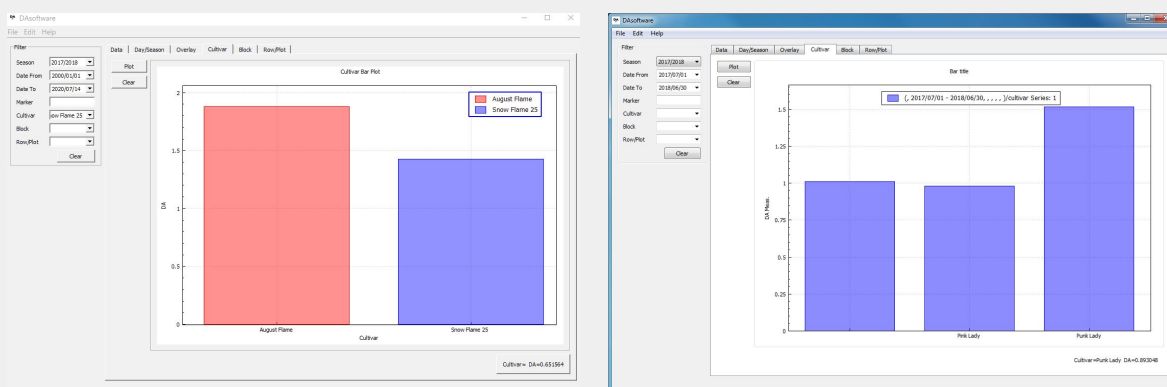
The **Overlay** module will also plot the DA Meter data against the date but without considering the year information. For each new plot, the year will start from 0, and this allows plots from different years to be overlaid for better comparisons between different seasons. For example, data from season 2018/2019 can be plotted and overlaid on top of data from season 2017/2018.

Note that measurements taken on February the 29th during leap years, will instead be changed to February the 28th in order to correctly display the plot. If the plotted data contains a measurement taken on February the 29th, a warning will be displayed.

Cultivar, Block, Row/Plots bar charts

The **Cultivar**, **Block**, and **Row/Plot** modules are bar plots showing the average DA Meter data per Cultivar, Block, and Row/Plot, respectively. This plot is a good option to chart the DA average value comparisons over selected periods for different cultivars, or the same cultivar over different blocks.

As described in the **Day/Season** plot section, one can select more than one Cultivar (Block or Row/Plot) to plot at the same time, and that will generate bar charts of different colours.



9. Plot editing options

The mouse wheel can be used to zoom in and out of plot, while clicking and dragging will pan. Selecting an axis by clicking it, will lock the other axis so that only the selected axis is adjustable.

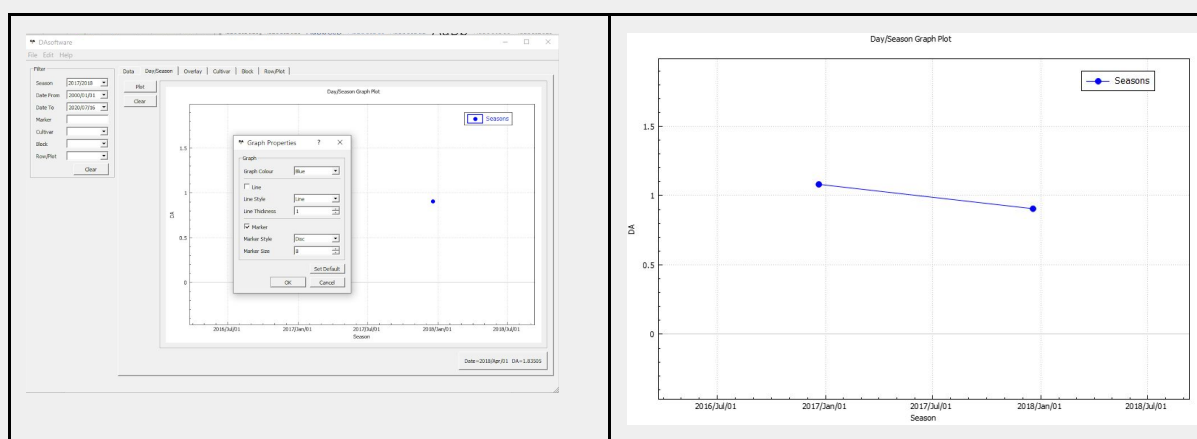
For example, selecting the horizontal axis will limit the plot to moving left/right while panning, while zooming will stretch the plot horizontally.

The currently plotted data can be re-centred by right clicking anywhere in the plot window and selecting **Refresh**. This will also return any labels that have been hidden, and move the legend back to the top right of the plot window.

Plot properties

The plot's properties such as colour, marker style, line style, and thickness can be changed by selecting the plot, right clicking, and selecting **Graph properties**. Pressing **Set Default** will set the specified options as the default settings for new plots. Note that the colour option is exempt from this, and a cycle is used to set the colour for new plots instead.

For instance, in the example below we want to draw a line joining the plot points. In the **Graph Properties** window select the **Line** option.

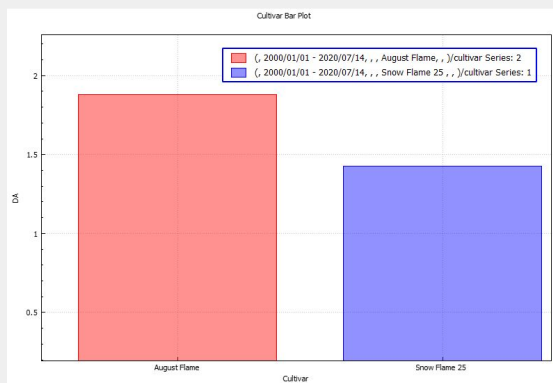


Plot legend

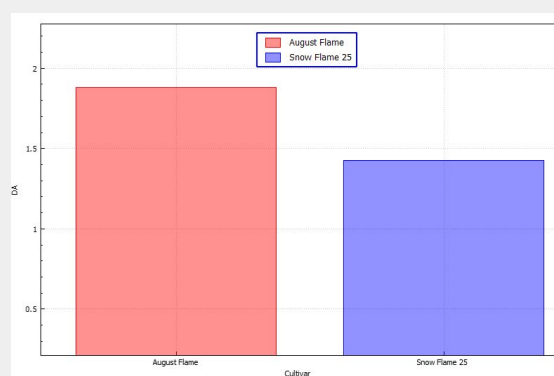
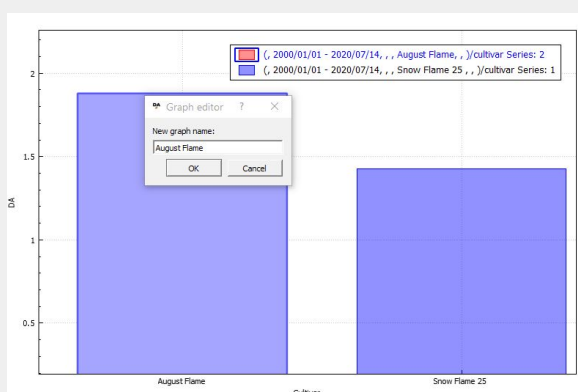
Plotting will automatically generate a legend of the data. By default the legend label shows all filter settings used to plot the data and the series number. The legend label may be changed by double clicking the label within the legend box. The legend can be moved by first selecting the legend (so that the box is highlighted), and then clicking and dragging the mouse.

The legend can be hidden from view by right-clicking anywhere in the plot window and selecting Legend. A tick indicates if the legend is visible or hidden.

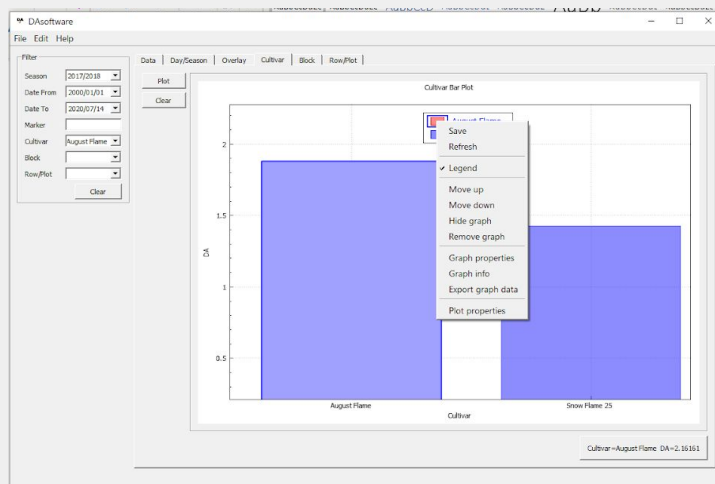
Example: editing the cultivar name in a bar chart. Once the Cultivar bar plot is created, the legend displays the information on the selected data. Click on the legend entry that you want to edit. The entry will be highlighted blue, right click and the **Graph editor** window and an editable text will appear. Modify the legend text and click OK.



- Step 1 (left): Generate a bar chart
- Step 2 (bottom left): Select one element of the legend and rename it
- Step 3 (bottom right): Repeat the process to rename all plotted data in the chart.



If more than 1 plot is present, then the plot order can be changed by first selecting the plot, right clicking, and pressing **Move up** or **Move down**. This is useful for visualising plots that have been hidden under newly plotted data.

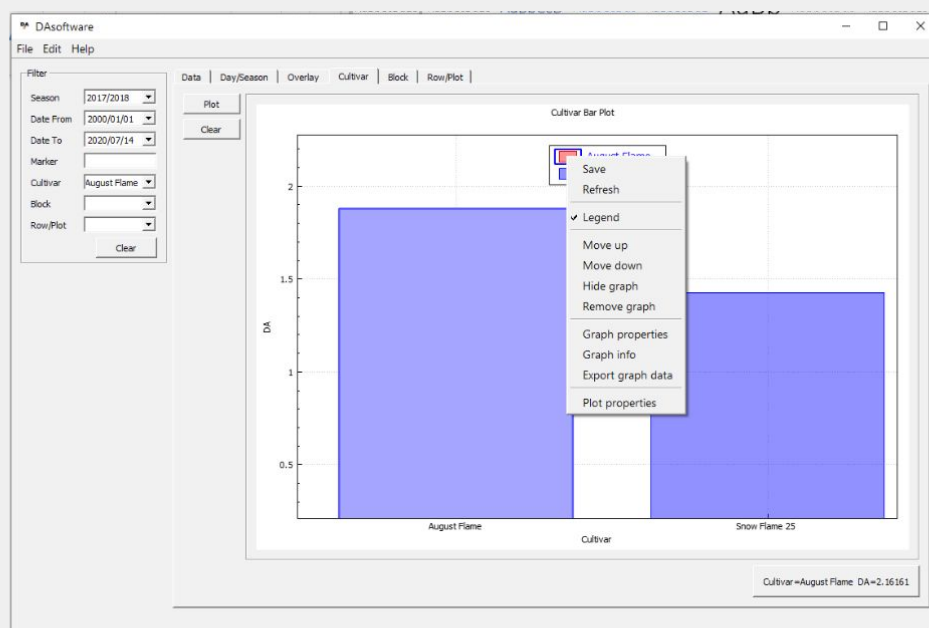


Plot title

The plot title (legend) and axis labels can be changed by double clicking them and entering a new label. Entering an empty label will remove the label from the plot. Right-clicking anywhere in the plot window and selecting **Refresh** will retrieve the hidden labels.

Saving and exporting charts

The plotted data can be saved in a comma-delimited format as a CSV file by selecting the plot, right clicking, and selecting **Export graph data**. A window will display prompting the user to specify a directory and filename for saving.



The **Export graph data** option will only save the data associated with a chart. If you want to save an image of the chart, as it looks on screen, right click anywhere in the plot window and select **Save**. A window will display prompting the user to specify a directory and filename for saving. The chart will be saved as a PNG file.

10. Troubleshooting

Can't start program, shows error missing .dll file.

Try running the Microsoft Visual C++ Redistributable for Visual Studio 2015, 2017 and 2019 package (vc_redist.x64.exe). Available from:

<https://support.microsoft.com/en-us/help/2977003/the-latest-supported-visual-c-downloads>

CSV file edited in Microsoft Excel and can't be reimported.

Microsoft Excel automatically changes the format of the date when opening the CSV file. Reopen the CSV file in Excel, select the **DATE** column data, right click, go to **Format Cells**, select **Date**, and under **Type**: select the required date format (i.e. yyyy/mm/dd). Save the file and try to re-import the data into DASoftware.

Importing DA Meter / CSV data file, shows error on line X.

Open the file in a plain text editor like Windows Notepad or Notepad++ (<https://notepad-plus-plus.org/>). Go to the line number and look for obvious errors in the formatting.

11. License

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Version 3, 29 June 2007

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Preamble

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Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

Terms and Conditions

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