

Manual NDICEA 6.2

First installation:

From downloaded Setup file:

Double click on Setup. The installation Wizard will lead you through the procedure. The program will be placed in C:/program files/Ndicea PP; you can choose an other location. A shortcut will be placed on your screen.

Installation of new version over an old one

The new version can be installed over the older version. For security reasons, first make a copy of your NDICEA files. Default location in Windows XP and older Window versions: C:\documents and settings\yourname\my documents\Ndicea.

In Windows Vista and Windows 7: ... Documents\Ndicea

If installation is not successful, first remove the former version and then install the new

Start the program

Double click on the shortcut on your screen

or

Go to C:\program files\Ndicea PP and double click on Ndicea.exe.

Start

Direct after first installation:

Choose your language, than OK

Click on [start] in the first screen.

Optional: Go to 'setup', top left. Click on 'lists'. Select in the lists of crops the crops you will need. A short list is more comfortable while using the program. You can come back here any time you want to change the settings.

General information.

With the F1 button you can open a help-file wherever you are in the program. In this help-file you can also find a general introduction.

While using the model, many default values are given. You can change them. If you do so, the background will change from white to yellow, showing you that it is a changed value. Right-clicking, you can restore the default value.

Examples.

Within the program, some example files can be opened. You can open them immediately after opening the program.

Click on [start] -> [open] -> make your choice

After opening the file, click on [start] of [proceed] -> results. After calculation, the first result screen is shown. Use [next] and [previous] to navigate through the results. Use F1 to open the help-file with explanations.

Create your own file

Click [start] in the main screen

(If you want to open an existing file, click [open])

For creating a new file, choose [new].

You can make two different types of scenarios: a rotation scenario and a field scenario.

* Rotation scenario. You insert a complete rotation: all crops in sequence as usual in your case. The calculation is done with average weather data. This is reached by putting the whole rotation in future with the button with the hand on it.

* Field scenario. You insert the data of one of your fields: the real data from the past, and reasonable expectations for the future. You can insert soil mineral nitrogen data.

Name

Give your scenario a name. This name will later be suggested as name to save this file.

Optional: give a short characteristic description of this field and period. If you put afterwards your cursor on the file name, top left, this description appears.

For a new file, the procedure is a bit wizard-like. Only the screens with a green margin can be opened.

Region

Click [Region]

Choose 'select environment by region choose'.

Choose the region in which the farm is situated.

Option: Choose your own weather data. See appendix.

Soil

Click [Soil] to open the Soil screen

Choose the soil type of the top soil

Choose the depth of the top soil

Fill in the pH of the top soil

Fill in the organic matter content of the top soil

Fill in the lowest groundwater level in summer

Fill in the highest groundwater level in winter

In case of a field without ground water influence, put in 500 cm for both groundwater levels.

Choose the soil type of the subsoil.

Fill in the maximum rooting depth: to what depth can roots reach in this type of soil or in this field?

Choose the intensity of soil tillage. For additional information, see below under the header 'soil tillage choice: beta version'

Organic matter.

If you have more measurements of soil organic matter of this same field in the period you are modelling, you can fill it in here. Click [Org. mat.] -> [+] to add a measurement and repeat this. During the calibration procedure these measurements are taken into account. Be careful: the measurements must be in relation to the depth of the top soil!

Mineral nitrogen.

If you have measurements of soil mineral nitrogen of this field within the modelling period, it can be filled in. Click [mineral] -> [+] to add a record. The topsoil measurements must correspond with the depth of the topsoil you selected (soil screen). The subsoil measurements

must correspond with the maximum rooting depth. If you have subsoil measurements 30-90 cm depth, then fill in in the soil screen, topsoil 30 cm, maximum rooting depth 90 cm. The measurements are visible in the result-screen 'course of mineral nitrogen'.

Soil, advanced

Don't change anything if you don't know what you are doing.

Click on [Advanced].

The left part of the larger screen is not changed. The middle and right part show soil-related parameters which play a role in the modelling. For explanation, see the help-file within the program (F1).

Most of these soil parameters are involved in the calibration procedure and will be adapted after calibration. This is than indicated with a red asterisk.

Crops

Click [Crops] to open the Crops screen.

Crops are inserted in the time sequence in which they stand on the field.

Crops and green manure: create the sequence

Click on [+] to start making your crop sequence. Under 'crop' and 'green manure' you find the list you made earlier. If you want to change your pre-selection, leave the crop screen and go to setup, top left.

From the crops, those lasting longer than one year are listed separately.

After selecting your first crop, change immediately the year of sowing. If you first continue listing your crops, you will have to change afterwards all the year indications.

Insert all crops for your situation. A scenario should be at least three years long (to reach sufficient accuracy in the last year) and cannot be longer than twelve years (maximum calculation length).

Calculations take place from January 1st until December 31st. You cannot start a scenario with a winter crop or a green manure staying over winter.

To insert a green manure: select the crop after which to insert the green manure, then go to the 'add a new crop' button.

Use the [X] button to remove a previously selected crop

With the arrow buttons you can move the selected crop one year up or down in the sequence.

With the button with the hand symbol you can change the years of all crops in one click.

Green manures:

The green manure will be linked to the previous crop. If you move a crop up or down in the sequence, the linked green manure goes with it.

To add green manures in your crop sequence, there are two possibilities

* Add a green manure direct after introduction of the main crop.

* After listing your main crops, select the crop after which you want to insert a green manure, and then select the green manure and insert it.

More crops in one year.

A new crop will automatically be placed in the next year. If you want to place it in the *same* year as the previous crop, change the year of sowing *immediately*. *If you don't and you continue listing your crops, you will have to change the year indication of all next crops!*

Repeat the introduction of crops and green manures until your sequence is correct and complete.

Crop properties

Select the first crop (left side) and choose the crop properties (right side of the screen). Repeat this for all crops and green manures.

Properties:

Fill in the realised sowing or planting date (history) or the expected sowing or planting date (prognosis)

Fill in the realised (history) or expected (prognosis) harvest date (for potatoes: moment of defoliating)

Fill in the realised (history) or expected (prognosis) yield.

In case of cereals: mark the small field if the straw is removed from the field. Keep it unmarked if the straw is left on the field.

In case of green manures: for 'yield', fill in the moment of incorporation in the soil. You can give an indication of the production level from insufficient to very good, eventually you can fill in a dry matter production.

Note pad.

Here you can write down some remarkable things ("Perfect sowing conditions") as a reminder. You will find them back in the overview screen below as a triangle below the crop bar. With the cursor on it you can read your text.

N-mineral

This is the same screen as can be opened in the soil screen.

Irrigation

For every crop you can fill in irrigation. Click on [Irrigation] -> [+] to open a record.

Eventually the nitrogen content of the water can be filled in. In the overview screen below the irrigation becomes visible as a small spherical above the crop bar. The cursor on this sign opens an information box.

Crops advanced.

Don't change anything if you don't know what you are doing.

Click in the crop screen on [Advanced]. The screen is widened and a lot crop-related parameters are shown. For explanation, see the F1 help file in the program.

Fertiliser

Click on [Fertilisers] to open the fertilisers screen.

Select the crop (left side) you want to add fertiliser to.

Click on [+] to open the list of fertilisers and make your choice. More fertiliser applications at one crop are possible. If you want to change the pre-selection of fertilisers, close the fertiliser screen and go to [setup], top left.

To remove a fertiliser, select it and use the [X] button.

For every application, the amount, the moment of application (default: date of sowing of the crop) and the mineral content can be changed.

Artificial fertilisers: amounts in kg N, P₂O₅ and K₂O per hectare.

Manures: amount in tons per hectare, mineral content in kg per ton fresh manure.

Some dried manure pallets: amount in kg per hectare and mineral content in % of product.

Fertiliser application on green manure: select the previous crop, choose the type of fertiliser and change the moment of application.

The fertiliser application will be linked to the crop; if you change the crop sequence (in the crop screen), the fertiliser application will move with the crop.

Manure application in the previous autumn can be linked to the previous crop (with a application date after crop harvest) or to the next crop (with an application date in the previous year).

Fertilisers advanced

Don't change the initial age if you don't know what you are doing.

Click on [Advanced]. One parameter is added to the screen.

Save the data of your own manure

Are you regularly using a type of manure which is not in the list? Select in the list the type which is most comparable with your own one; change the parameters, insert (top right) the name you want to give to your manure and use 'save'. Your manure is added to the list of fertilizers.

Results.

Click on [Start]/[Proceed]

Click on [Results]. Now all calculations take place, and the first result screen will be opened. (For repeated calculations, see further down)

General.

** Two scenarios to compare*

While looking at the results, you can open a second scenario (or field) to compare the results. For this, click the folder button top right and select the second scenario (field) file. This makes only sense in case of mainly comparable scenario's, for example the same crop sequence with and without green manures, or the same crop sequence with different fertiliser applications.

If you want to create and compare scenarios with a few differences:

- make an original one and save it
- change some things you want to compare and save it under a comparable name (add a '2' or add 'var' or something like that)
- go to [Proceed] , [Results]
- open the second (original) file as described above

Now you can compare the results.

** Zoom in*

You can zoom in with the button down left.

* Go to www.ndicea.nl and download the text about interpretation of the results.

Result screens, one by one.

Available nitrogen

For every crop period, two lines are shown: red, representing crop uptake, and green, representing available nitrogen. The green line is the net result of nitrogen increase and decrease.

Green goes under red: calculated nitrogen shortage to reach the assumed yield.

Course of soil mineral nitrogen

For the topsoil (depth: see soil screen) and the subsoil (for scenarios: up to 60 cm depth) the course of mineral nitrogen (nitrate) during the crop rotation is given.

Nitrogen leaching

The loss of nitrogen towards deeper soil layers is given per crop period together with the following bare period. Starting a new crop, the graph is reset at zero except for green manures sown under the main crop.

Losses of 100 kg/ha or higher in one period are to be avoided. No peaks above 50 kg/ha is pretty good. (For rotation average, see result mineral balance)

Analyse the situation. When is leaching high? After which crop which fertiliser? Compare the leaching graph with the previous graphs.

Denitrification

Stating each year first of January at zero, the cumulative denitrification out of the topsoil is given. Compare these results with the graph 'course of soil mineral nitrogen'.

Rainfall

Graph of rainfall, daily total (blue) and irrigation (green)

pF topsoil

pF 2 stands for field capacity: the amount of water a soil can contain in balance. In case of a pF above 3, soil moisture content is limited.

Nitrogen mineralization.

Graph, from left to right, all data in kg per hectare per year, average over the crop rotation:

- * mineral nitrogen added to the soil in fertilisers or manures
- * nitrogen mineralised out of organic manures
- * nitrogen mineralised out of crop residues
- * nitrogen mineralised out of green manures
- * nitrogen mineralised out of older soil organic matter

Mineral balance

Calculated balance, assuming that all crops in the sequence are grown on the same size fields (every crop and connected fertiliser contributes equal to the balance).

Applied manure: amount multiplied by default mineral content or by the content you filled in yourself.

Product removal: default mineral content multiplied by default yield or the yield you filled in.

Course of soil organic matter

Starting value: the % soil organic matter you filled in for the top soil (Soil screen)

Graph going up, horizontal or going down: trend of the soil organic matter changes as a result of this crop rotation and fertiliser application.

If the trend shows a decrease of 0,02% per year: try and find out by modelling alternatives what to do to improve the soil organic matter trend.

Trend: calculated trend.

Organic matter supply and decay

Data given as average per hectare per year.

Left graph: supply of organic matter out of crop residues, green manures and manures.

Right graph: decay

Other aspects related to the results

Repeated calculations

If you have a rotation scenario (complete rotation, all placed in future) you can repeat the calculations. By doing so you can see the results after the number of repetitions of your choice, enabling to see further in future. The results of repeated calculations will especially differ from the first cycle if the organic matter balance is strong negative or positive.

Click proceed -> repeat calculations and choose the number of repetitions.

Calibration

If you have two or more N-mineral measurements in your modelling file, the [calibrate] function is enabled. By calibrating, the model is varying some soil parameters within preset boundaries to reach a better match between the calculated and the measured values of soil mineral nitrogen. In the graph 'Course of mineral N' the line indicating topsoil mineral N will in general come closer to the measurements than before calibration. The default soil parameters are replaced by field specific values. You can find them in the screen soil -> advanced, marked with a red asterisk.

After filling in at least two soil mineral N measurements, you are automatically invited to calibrate. You can reach the function also via [Proceed] -> [Calibrate].

The calibration procedure will last up to some minutes, depending on the initial difference between measured and modelled level and depending on the capacity of your computer.

Calibration becomes better when more N-mineral measurements are filled in. You are advised to measure several moments within one season. A guideline is:

- * beginning of March
- * three weeks after sowing/planting

- * immediately after harvest (Potatoes: after defoliation)
- * three weeks after sowing green manure
- * end of October

Soil tillage choice: beta version

In version NDICEA6.2 the option is offered in the soil screen to choose the intensity of soil tillage: conventional, reduced, minimal. The intensity of tillage is reflected in the decay of soil organic matter: frequent, intensive and deep tillage increase the decay of soil organic matter and by this the mineralization of nitrogen. Less intensive tillage saves soil organic matter. In the NDICEA model this is regulated by the ‘protection factor’, also called ‘texture factor’. This parameter has to do with the degree of protection of soil organic matter to decay processes. On clay soils the protection is higher than on sandy soils, and the value of the parameter is lower. Reducing soil tillage also reduces this parameter value. Three classes of soil tillage is a rough approach, and the values used are not yet validated. That’s why this part of the model has a beta version status. The protection factor can be found in the soil screen -> advanced. You can adapt the value if your results seem to be insufficient, but do this only when you really know what you do. Another way to adapt the protection factor is via calibration; see above.

Printing and saving of results.

It is not needed to save the results of the calculations. The scenario or field settings are saved in the file and the results are calculated again after opening the file and asking for the results.

The program offers the opportunity to create an electronic or paper report of the scenario and field data and the results. This can be communicated without the NDICEA program. You can send the electronic report to somebody else who can open it without having the NDICEA program.

Printing the result report.

In all results screens: click [Print]. Now you can choose which data and results you want to print or save. Make your selection and click [OK]. A new screen is opened (Ndicea print example) in which you can preview your report. If it is what you want, click [Print] and continue.

Saving the result report

This is the same as printing, but instead of clicking [print] you select [save]. Select the location where you want to save it and give a name to the file.

Further developments

On www.ndicea.nl you will find the most recent version of the model, and further information. The model (> 5 MB) and the short manual can be downloaded free.

In case of troubles with installation and in case of questions about the model or the use of it, contact the model administrator at info@ndicea.nl

Information about the Louis Bolk Instituut can be found on www.louisbolk.nl

Appendix

How to use other weather data.

Region window: select 'choose an environment file for each year'.

Click on the map at the end of each line. Now you can choose between 'custom environment' and 'region' name. In case of 'region name' you find the years which are available and four other files:

- 30 year average: an 'average' year: not cold, not warm, not wet, not dry.
- Dry circumstances: as the 'average' year, but rainfall 25% less (rainfall pattern not changed)
- Wet circumstances: as the 'average' year, but rainfall 25% more (rainfall pattern not changed)
- Very wet circumstances: as the 'average' year, but rainfall 50% more (rainfall pattern not changed)

With 'custom environment' you can select your own environment file. If you want to make your own environment file, contact info@ndicea.nl. You need: average day temperature, total rainfall per day, total Global radiation per day.