MOTTI USER’S GUIDE
version 3.3
Getting started and software registration

Trial period for MOTTI is 30 days. Thereafter, registration is mandatory. Registration is important for further development and customer support. Contact information is used only to send information related to Motti-software.

1. Start registration process by pressing "Registration"-button

2. Click "from web pages" - link

3. Fill in registration form and press "Send"-button.
Getting started and software registration

4. Here is your key code

5. Move back to registration window of Motti and copy-paste the key code from the web browser.

You can also enter the key by typing it.

6. Press the Register-button to complete the registration procedure.

After registering you will get a confirmation message.

Motti will launch after pressing OK-button.
Using Motti-software

**Step-by-step instructions:**

1. **INITIALIZATION.** First you have to create or import a stand. There are three possibilities to create a stand. You can enter stand data interactively, you can open data that you have already entered and saved, or you can open a pmt-file.

2. **SIMULATION.** Here you can guide the simulation step by step or select automatic simulation.

3. **RESULTS.** In this section you can compare yield and economy.

4. **CONTROL.** Here you can start a new simulation with current stand or start all over by selecting a new stand.
The User’s Guide is based on captured views from the application.

The actual user’s instructions are in text boxes with white background.

Ball-ended lines point to the current topic.

General features of the application are in text boxes with blue background.

ATTN! Text boxes with red background include restrictions and important recommendations.

You can open the user’s guide by clicking HELP -> Manual.
About using Motti-software

1. **Product licence**
   You are not allowed to distribute the application or its components. Results produced with MOTTI may not be sold, published or otherwise distributed without a written permission from Natural Resources Institute Finland. Using MOTTI for commercial purposes is allowed only prior written permission from Natural Resources Institute Finland.

2. **Customer support**
   Inquiries should be directed to e-mail address motti.metinfo@metla.fi.

3. **System requirements**
   MOTTI –application is designed for Windows 7, Windows 2000 ja Windows XP –operation systems. Display resolution must be at least 1024 x 768 pixels. Installation requires approximately 20 Mb of free space on hard drive. **ATTN! The user must have write –permission to MOTTI –folder (the target folder can be selected during installation procedure).**
1. Initialization

Stand initialization:
- manual input (interactive input of stand characteristics) or
- open a stored initialization
- open inventory data in pmt-format
1.2. Initialization of stand data

Select: Initialize a stand → Initialize Location

Select the municipality of the stand. Based on that selection, MOTTI automatically retrieves:
- temperature sum
- coordinates
- altitude

When you are ready to proceed, click Next.
1.2. Initialization of stand data (2/8)

Site quality and applied management practices

Select soil type (mineral soil or peatland)

Select site type

Optional specifications of the site

Define time since the implementation of management practices

When you are ready to proceed, click Next
Define the initial stocking to be simulated either:
Simulation of an established stand (see chapter 1.2 (4/7))
or
Start the simulation from the regeneration (see chapter 1.2.(7/7))

When you start the simulation from the regeneration, Motti predicts the amount of naturally regenerated seedlings. Tree species and the number of these volunteers depend on site type and the amount of seed trees. Naturally regenerated seedling will be predicted also on artificially regenerated sites (after seeding or planting).

**ATTN!**
You can start the simulation from the regeneration phase only on mineral soil sites. On peatland sites, initial stand has to be an established stand with mean height more than four meters.
1.2. Initialization of stand data (4/8)

**Established stand**

Choose the simulation of an established stand

Choose dominant tree species

Stocking data are given separately for each stratum. Start by clicking here.
1.2. Initialization of stand data (5/8)

Stocking data

Specify the main species, tree storey, and regeneration method of the stratum.

Add stand information: stand age is a mandatory information. Fill in also other known characteristics. Leave the unknown data fields empty.

ATTN! If you give the basal area, use also basal-area-weighted mean diameter and basal-area-weighted mean height. If you only give number of trees (N) and not basal area, use arithmetic mean height and arithmetic mean diameter.

ATTN! On drained peatlands stand age depicts the time elapsed from ditching.

When the stratum is defined, click "OK"

In young (sapling) stands, it is recommended to give at least the number of trees and the mean height of stand.
1.2. Initialization of stand data (6/8)

Stocking data

If you want to add a new stratum, click "Add a stratum"-button.

When you are finished, click "Create"-button.
1.2. Initialization of stand data (7/8)

Select the regeneration method:
- planting or
- sowing or
- natural

You can also choose the "recommendation"-button and Motti makes the choices.
1.2. Initialization of stand data (8/8)

**Artificial regeneration:**

- Select the regeneration method first.

**Regeneration**

- Give dominant tree species, number of planted/seeded trees, and survival rate (%).
- Choose if site preparation and/or clearing of regeneration area will be carried out.
- You may provide the information of the retention trees.
- Motti predicts the development of retention trees, and their effect on the dynamics of the regenerated stocking. You cannot apply any treatments to retention trees and they are not included in cutting removals.

**Natural regeneration:**

- Give the information of the seed trees.
- Define if site preparation and/or clearing of regeneration area will be carried out.
1.2. Opening saved initializations

Pick: INITIALIZATION ➔ Open

Saved initializations are represented here.

Select a stand –
• To edit it
• To remove it
• For the simulation
1.2.1 Editing saved initializations

Select: INITILIZATION → Open → select a stand → Edit →
Edit selections → Create

Select a stand and press "Edit"-button.

Press Create-button after you have completed the changes.

Save edited initialization to a new initialization. (chapter 2.1).

Start simulation!
1.4. Retrieving stand data from forest inventory file

Select: Initialization of stand → Open Solmu-file

The forest inventory files used in private forestry are usually pmt-formatted.

Once the correct file is selected, click "Open" button.
1.4. Retrieving stand data from forest inventory file (2/3)

Picking a compartment from the inventory file

Once you’ve opened a forest inventory file, all the compartments of that inventory are listed.

Select the compartment you want to simulate, and click OK.

**ATTN!** MOTTI can only simulate compartments with established stocking. If a compartment is an open regeneration area, initialization has to be done manually (see chapter 1.2. (7/7)).

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Site class</th>
<th>Site type</th>
<th>Main species</th>
<th>Age</th>
<th>Development class</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Mineral soil</td>
<td>fresh</td>
<td>pine</td>
<td>36</td>
<td>Young thinning stand</td>
</tr>
<tr>
<td>11</td>
<td>Mineral soils</td>
<td>fresh</td>
<td>spruce</td>
<td>3</td>
<td>Young seedling stand, less conserved coniferous stand</td>
</tr>
<tr>
<td>30</td>
<td>Mineral soils</td>
<td>fresh</td>
<td>pine</td>
<td>25</td>
<td>Young thinning stand</td>
</tr>
<tr>
<td>40</td>
<td>Mineral soils</td>
<td>dryish</td>
<td>pine</td>
<td>36</td>
<td>Young thinning stand</td>
</tr>
<tr>
<td>50</td>
<td>Mineral soils</td>
<td>fresh</td>
<td>pubescent birch</td>
<td>77</td>
<td>Mature stand</td>
</tr>
<tr>
<td>60</td>
<td>Mineral soils</td>
<td>fresh</td>
<td>pubescent birch</td>
<td>47</td>
<td>Young thinning stand</td>
</tr>
<tr>
<td>80</td>
<td>Mineral soils</td>
<td>fresh</td>
<td>pine</td>
<td>27</td>
<td>Young thinning stand</td>
</tr>
<tr>
<td>90</td>
<td>Mineral soils</td>
<td>fresh</td>
<td>pine</td>
<td>37</td>
<td>Young thinning stand</td>
</tr>
<tr>
<td>100</td>
<td>Mineral soils</td>
<td>fresh</td>
<td>pine</td>
<td>29</td>
<td>Young thinning stand</td>
</tr>
<tr>
<td>120</td>
<td>Mineral soils</td>
<td>dryish</td>
<td>pine</td>
<td>35</td>
<td>Young thinning stand</td>
</tr>
<tr>
<td>130</td>
<td>Mineral soils</td>
<td>dryish</td>
<td>pine</td>
<td>33</td>
<td>Young thinning stand</td>
</tr>
<tr>
<td>140</td>
<td>Mineral soils</td>
<td>dryish</td>
<td>pine</td>
<td>42</td>
<td>Advanced thinning stand</td>
</tr>
<tr>
<td>150</td>
<td>Mineral soils</td>
<td>dryish</td>
<td>pine</td>
<td>67</td>
<td>Young thinning stand</td>
</tr>
</tbody>
</table>
1.4. Retrieving stand data from forest inventory file (3/3)

Manually updating stand data from inventory

Once you’ve selected the compartment, all the strata in that stand are listed. Select the stratum you want to update.

The data of the selected stratum are listed here. You can change the data, remove the whole stratum, or add new ones.

When you are ready to proceed, click OK.
2. SIMULATION

1. "Automatic" simulation according to the pre-defined management schedule
   - Thinning schedule according to the practical management recommendations for private forests of Finland.
   - Pre-defined criteria for final felling based on stand mean diameter
   - Default simulation for stands growing on mineral soil site types

2. User-defined step-wise simulation
   Management practices:
   - Simulation step-by-step (1-5 years)
   - Clearing of a sapling stand
   - Precommercial thinning
   - Cuttings
     - Removal of seed trees
     - Commercial thinning
     - Final cut
   - Silvicultural management practices
     - Fertilization (on mineral soils)
     - Supplementary ditching (on drained peatlands)
     - High pruning

3. Simulation according the user-defined management schedule
   - Customized management schedule for the whole rotation
     - User-defined thinning thinning program
     - User-defined criteria for the final felling (mean diameter od stand age)
2.1. Selection of a management schedule (1/2)

If you have interactively defined the stand data (Initialization => Initialize) you can save the input data, and write the name of the input data in the "Description" field.

Management schedule according to the practical management recommendations for private forests of Finland (default).
Motti simulates the stand development according to the recommendations of Forestry Development Centre Tapio. If you choose this option, the stand development will be simulated automatically until the final felling. This is the default management option.

User-defined management schedule
You can name your own management program, and define all the management practices listed below the title "Management practices".

ATTN!
Automatic management schedule is available only for the most common stand types on mineral soils.

If you have interactively defined the stand data (Initialization => Initialize) you can save the input data, and write the name of the input data in the “Description” field.

Forest management recommendations are documented in the publication of Forestry Development Centre Tapio (2006) : "Hyvän metsähoidon suositukset". [In Finnish] Stand mean diameter is applied as a criterion for the final felling.
2.1. Selection of a management schedule (2/2)

**Growth rate adjustment**

Growth predictions are valid on average commercial forests in Finland. User has an option to choose a higher growth rate level for a cultivated stand that has been intensively managed from its establishment and therefore is supposed to grow faster than average stands.

This feature is available only for mineral soils and it affects most in pine stands of northern Finland.

The default value of growth rate adjustment is “not in use” (not checked) and the selection is reset to the default every time the stand data is opened.

**ATTN!**

If you select growth rate correction for a non-cultivated stand, you will be reminded that it is valid only for cultivated stand. Yet, the higher growth level remains checked unless you reset it.
2.2 Main view of the stand simulation

Information concerning the automatic thinning guide.

Simulated management schedules. You can activate the simulated management schedule by clicking the mouse over the title.

Site information about the simulated stand

During the simulation, you can change the contents of this table (stocking data or removal data) by pressing ">>"-button

Information about the logging removals or the growing stock of the active (or current) simulation are shown here.
2.2 Main view of the stand simulation (2.3)

A thick red line depicts the development of stand basal area of the simulated stand (m²/ha)

Thinning guide of Forestry Development centre Tapio
- black lines: recommended stocking level before thinning
- green lines: upper and lower limits of recommended stand BA after thinning

**ATTN!** Values on the x-axis depict simulation year, not the stand age!

By pointing here with the mouse, you can see the information about the growing stock
2.2 Main view of the stand simulation (3.3)

Symbols below the x-axis
- i - information about the growing stock
- CL - clearing of a sapling stand
- PT - precommercial thinning
- FT - first commercial thinning
- SR - removal of the seed trees
- T - commercial thinning
- FC - final felling
- E - energy wood thinning
- F - fertilization (on mineral soils)
- HP - high pruning
- D - supplementary ditching (on peatland forests)

By pointing the mouse over the symbol you can see the information about the growing stock (T) or management practices (TH, EH, H, P, L)

L | FERTILIZATION
--- | ---
Dose | [kg N/ha] 00.00
No Phosphorus

T | THINNING
--- | ---
Removal | [m³/ha] 66.46
Removal | 34.13
2.2. Stand simulation

Choose: Management practice → Growth - 5 year

By pressing the left bottom of the mouse Motti simulates the stand growth for 5 years. You can change the simulation step from 1 to 5 years by pressing the right bottom of the mouse.

ATTN!
The growth prediction is most reliable, if you choose 5-year simulation step. Shorter simulation periods should be used only, when it is necessary to schedule the management practice to a certain year.

There is no undo-button in Motti. If you want to start over go to CONTROL->New simulation.
In the cleaning of a sapling stand, those trees belonging to main tree species and having development potential are left growing. In planted or seeded stand, all the cultivated seedlings are left growing. In naturally regenerated stand, the stem number after cleaning varies between 1500 - 3000 trees per hectare depending on site and dominant tree species.

Cleaning of sapling stand can be implemented in young seedling stands with mean height below two meters. Cleaning of sapling stand is a fixed management practice that will be implemented strictly according to the rules mentioned above. After the treatment, MOTTI will predict natural regeneration. Thus, the stand stem number can increase due to predicted ingrowth even after cleaning of sapling stand.
2.4. Precommercial thinning

Choose: Management practice → Precommercial thinning

Motti shows the current stem numbers by tree species.

Press "Thin"-button to proceed.

Write here stem numbers by tree species after precommercial thinning.

Precommercial thinning can be carried out in stands with dominant height between 2 - 8 meters.

In precommercial thinning, seedlings having no development potential are removed first. Then if necessary, seedlings having development potential are removed until predefined density (trees/ha) is met.
2.5. Commercial thinning

Choose: Management practice ➔ Thinning

In case of the first commercial thinning you can choose, if strip roads are made by removing automatically 18% of stand basal area applying systematic thinning. Alternatively you can define the thinning by yourself without opening the strip roads.

You can choose whether or not include pre-cleaning to the thinning. Pre-cleaning doesn’t have effect on tree growth, but it is taken account as an additional cost.

If the simulation starts from the regeneration, the history of the stand is recorded automatically. On the other hand, when simulating established stands, MOTTI concludes based on the stand characteristics and treatment history, whether the thinning in question is the first commercial thinning.
2.5. Commercial thinning (2/9)

First, choose the tree storey to be thinned
- single-storey stand: choose stand
- in multi-storied stand you can define the tree storey to be thinned
  - dominant storey
  - under-storey
  - over-storey

In this field you can see the information of the growing stock by tree species before thinning. If you have asked Motti to open the strip roads, the figures depict the situation after opening the strip roads.

Define the amount of the growing stock after thinning
1) Choose the criteria for the amount of the growing stock after thinning: stem number, basal area or volume
2) Define the amount of growing stock

Motti shows the relative removal (% of the growing stock)

You can move to the next screen by pressing the red arrow button.
2.5. Commercial thinning (3/9)

In mixed stand you can define thinning by tree species.
### 2.5. Commercial thinning (4/9)

#### Proportions of tree species before thinning

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>Before thinning</th>
<th>After thinning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pine</td>
<td>91.0%</td>
<td>Pine</td>
</tr>
<tr>
<td>Spruce</td>
<td>0.7%</td>
<td>Spruce</td>
</tr>
<tr>
<td>Silver Birch</td>
<td>2.8%</td>
<td>Silver Birch</td>
</tr>
<tr>
<td>Pubescent Birch</td>
<td>5.2%</td>
<td>Pubescent Birch</td>
</tr>
<tr>
<td>Aspen</td>
<td>0.3%</td>
<td>Aspen</td>
</tr>
<tr>
<td>Grey Alder</td>
<td>0.0%</td>
<td>Grey Alder</td>
</tr>
<tr>
<td>Other Deciduous</td>
<td>0.0%</td>
<td>Other Deciduous</td>
</tr>
</tbody>
</table>

Choose the tree species to define its proportion after thinning (click the left mouse button on the name of the tree species).
2.5. Commercial thinning (5/9)

Define the target proportion of the tree species (% of the stocking after thinning)

Repeat the procedure for the other tree species.
After defining the target proportions for the tree species, Motti displays the proportions of tree species after thinning.

### Before thinning

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>% Number of Stems</th>
</tr>
</thead>
<tbody>
<tr>
<td>pine</td>
<td>91.0</td>
</tr>
<tr>
<td>spruce</td>
<td>0.7</td>
</tr>
<tr>
<td>silver birch</td>
<td>2.8</td>
</tr>
<tr>
<td>pubescent birch</td>
<td>5.2</td>
</tr>
<tr>
<td>aspen</td>
<td>0.3</td>
</tr>
<tr>
<td>grey alder</td>
<td>0.0</td>
</tr>
<tr>
<td>other deciduous</td>
<td>0.0</td>
</tr>
</tbody>
</table>

### After thinning

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>% Number of Stems</th>
</tr>
</thead>
<tbody>
<tr>
<td>pine</td>
<td>93.8</td>
</tr>
<tr>
<td>spruce</td>
<td>0.0</td>
</tr>
<tr>
<td>silver birch</td>
<td>0.0</td>
</tr>
<tr>
<td>pubescent birch</td>
<td>6.2</td>
</tr>
<tr>
<td>aspen</td>
<td>0.0</td>
</tr>
<tr>
<td>grey alder</td>
<td>0.0</td>
</tr>
<tr>
<td>other deciduous</td>
<td>0.0</td>
</tr>
</tbody>
</table>
2.5. Commercial thinning (7/9)

Choose the type of thinning. Motti has the default profiles for the following thinning types:
- thinning from below
- thinning from above
- quality thinning (thinning from above)
- systematic thinning

ATTN!
Growth prediction is most reliable in stands thinned from below, when thinning intensity is below 40% of the growing stock.
2.5. Commercial thinning (8/9)

Accept the thinning by pressing "OK"-button.
2.5. Commercial thinning (9/9)

Information of the growing stock after thinning will be displayed in this view.

You can proceed with thinning by pressing "Continue thinning"-button, or complete the procedure by pressing "Ok"-button.
2.7. Fertilization

Choose: Management practise → Fertilization

Mineral soils
- Select fertilization type
- Select if you want to included phosphorus
- Select the fertilization dose by selecting the amount of pure nitrogen (kg N/ha).

Peatlands
- Select the amount of ash (kg/ha)
- Select the proportion of Phosphorus.
2.8. Supplementary ditching (=Ditch network maintenance)

Choose: Management practice → Supplementary ditching

ATTN: Applicable only on drained peatland sites!

Supplementary ditching affects tree growth. The effects of ditching on the forests economics (costs) can be defined after the simulation in RESULTS → Economics.
2.9. High pruning

Choose: Management practice → High pruning

Click "High pruning"-option

High pruning has no effect on the growth prediction. The effects of pruning on the forest economics (pruning costs and the price of pruned logs) can be defined in RESULTS → Economics

Motti "marks" pruning to be completed
2.9. Final felling

Choose: Management practice → Final cut

Motti has an automatic procedure in the selection of the retention trees. Tree species to be left as retention trees are favoured in the following order: aspen, other deciduous trees, Scots pine, Norway spruce.

For each tree species, retention trees are selected evenly from size distribution. This selection mimics the procedure, in which the retention trees are left in tree groups.

You can define the number of retention trees (trees per hectare)

To complete the procedure, press "OK"-button
2.10. Customized management schedule

Choose: management schedule → Define and grow

You can define a customized management schedule, which includes:
- customized thinning program
- user-defined criteria for the final cut (stand age or stand mean diameter)

Customized management schedule is based on practical management recommendations for private forests of Finland.

You can customize the recommendations by altering e.g.:
- maximum allowable stocking level before thinning
- thinning intensity
- thinning type (tree selection in thinning)
Select the operations you want to include in the management schedule.

If you want to include energy wood to your management schedule, click here.

Select the thinning method to thinnings.

Select the thinning limit.

Select maximum removal.

Select the remaining stock.

If you want to include final cut into your management schedule, activate it here.

Final cut options are listed here. You pick age and/or dbh limits to the final cut.

Customize the management recommendations of Tapio.
2.11. Timber assortment definitions

**Select: Thin. settings → Timber assortments**

**Define minimum top diameter of saw logs by tree species**

**Short saw logs:**
In addition to pulpwood and saw log assortments, you can define short saw log assortment. For trunks that fulfill saw log dimensions, short saw log assortment can be defined between pulpwood and saw log. Trunks smaller than sawtimber specifications can be cut into short saw logs and pulp wood. You may define the minimum diameter and length of short saw logs.

When you are ready to proceed, click OK

**Define the minimum diameter of pulpwood**

**Sawtimber reduction:**
Due to different kind of defects in trunks, the actual saw timber yield is usually clearly lower than predictions based on stem dimensions only. The saw timber yield reduction models are based on timber quality measurements of the National Forest Inventory.

**Define the minimum length of pulpwood**
2.12 Recovery of energy wood

Activate energy wood selection here.

Set the diameter limit to select trees left outside energy wood selection.

Select the compartments to be collected as energy wood. You can also adjust the recovery rates.

If recovery of energy wood is activated the red ball marking basal area level changes its color to green.

NOTICE!
Current changes will be applied only to the forthcoming thinnings.
Starting a new simulation resets these settings.
3. RESULTS

Viewing the simulation results

Growth and yield:
- Information of timber yield and removals

Forest economics:
- Information of the forest economics of the completed simulation

Graphs:
- Graphs of the development of stand characteristics

Reports:
- Excel output of stand level data and removals
3.1. Yield

Choose: Yield

MOTTI produces tables and graphs of the predicted yield by tree species, timber assortments.

From window menu you can choose:

Period:
- rotation period
- per year

Units:
- m\(^3\)/ha
- kg/ha

If you want to inspect only one species at time then make the selection here.

You can also select a specific cutting when commercial removal is selected.

To close the window click "Close"-button.
3.2. Financial analyses

This table shows for each management schedule:
- net present values of cutting revenues (valued at stumpage)
- silvicultural costs
- discount rates 0%-6%

Press "+" button for more detailed table of revenues and costs

Choose the discount rate here

bar representing net present value according to given discount rate, €/ha

NOTE!
MOTTI does not calculate financial values unless the user has chosen to execute final cut (SIMULATION → Management practice → Final cut)
3.2. Financial analyses

Choose: Economy → Unit prices → Stumpage prices

You can determine stumpage prices by tree species, timber assortments, and by cutting type, €/m³.

Selected price group is then the active price group. All the prices are taken from this group.

You can determine stumpage prices by tree species, timber assortments, and by cutting type, €/m³.

You can also adjust price to the energy wood and define subsidies.

ATTN! Financial analyses are based on stumpage prices. Harvesting costs cannot be analyzed in this context.

To save prices see page 4/4
3.2. Financial analyses

Choose: Economy → Unit prices → Costs

The user can determine individual unit costs (€/ha) for actions: fertilization, forest drainage, artificial regeneration, precommercial thinning and pruning. Government subsidies can also be given for each action.

By changing values (wood prices and/or costs), financial results are automatically updated according to the new values.

To save prices see page 4/4

IMPORTANT: The implementation of management practices are determined in the SIMULATION module. In the Costs view, costs of those practices that have been carried out in simulation, are shown on white background, and can be modified. The costs shown in boxes with gray background are inactive and cannot be modified.
3.2. Financial analyses

In this table, the results of all the simulations are displayed.

Changing of stumpage prices, unit costs or discount rate affects the financial results of all the management schedules.

If you want to save the changes you have made to stumpage prices or silvicultulur costs press the “Save”-button.

Stumpage prices and silvicultulur costs of a specific price group are always linked to together.

Pressing “Save”-button saves all the prices into the active price group.

By pressing “Close” button user closes the viewing of financial analyses.
3.3. Graphics

Choose: Graphics

MOTTI produces graphics on stand characteristics associated with each management schedule.

The development curve(s) for management schedule(s) to be displayed can be chosen here.

Stand characteristics (to be displayed) can be chosen here.

Choose here the tree species to be displayed.

By choosing "Close" the user can end viewing Graphics.
3.4. Reports

Choose: Reports
3.4. Reports

### Stand data

Simulation: number of simulation  
Year: Simulation year  
Age: Age of stand  
N: Number of trees/ha  
BA: Basal area  
Hg: Weighted mean height, m  
Dg: Weighted mean diameter, cm  
Hdom: Dominant height  
Total volume: Volume of living stock  
Log: Log volume of the living stock  
Pulp wood: Pulp wood volume of the living stock  
Waste wood: Waste wood volume of the living stock  
Yield: Total yield. Living stock+removal+mortality, m$^3$/ha  
Mortality: Volume of dead trees, m$^3$/ha

### Stand data

**Biomass variables, 1000 kg/ha**  
Stem (commercial wood)  
Stem (waste)  
Living branches  
Dead branches  
Foliage  
Stumps  
Roots > 2 mm  
Fine roots
<table>
<thead>
<tr>
<th>Simulation</th>
<th>Year</th>
<th>Id Thinning</th>
<th>Thinning</th>
<th>Id Species</th>
<th>Species</th>
<th>Log [m³/ha]</th>
<th>Small log [m³/ha]</th>
<th>Pulpwood [m³/ha]</th>
<th>Energy wood [m³/ha]</th>
<th>Energy wood [m³/ha]</th>
<th>Energy wood [m³/ha]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>31</td>
<td>2 First thinning</td>
<td>2 spruce</td>
<td>spruce</td>
<td>23,234</td>
<td>0</td>
<td>57,318</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>31</td>
<td>2 First thinning</td>
<td>3 silver birch</td>
<td>silver birch</td>
<td>0</td>
<td>0</td>
<td>1,316</td>
<td>0</td>
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<td>0</td>
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<td>1</td>
<td>41</td>
<td>Thinning</td>
<td>2 spruce</td>
<td>spruce</td>
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<td>0</td>
<td>62,564</td>
<td>0</td>
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<td>5</td>
<td>1</td>
<td>41</td>
<td>Thinning</td>
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<td>silver birch</td>
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<td>2,256</td>
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<tr>
<td>6</td>
<td>1</td>
<td>52</td>
<td>Final cut</td>
<td>2 spruce</td>
<td>spruce</td>
<td>329,38</td>
<td>0</td>
<td>72,533</td>
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<tr>
<td>7</td>
<td>1</td>
<td>52</td>
<td>Final cut</td>
<td>3 silver birch</td>
<td>silver birch</td>
<td>0</td>
<td>0</td>
<td>0,793</td>
<td>0</td>
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</tr>
</tbody>
</table>

**Removal info**
- Simulation
- Year
- Id Thinning
- Thinning
- Id species
- Species

**Removal, collected as commercial wood, m³/ha**
- Log, m³/ha
- Small log, m³/ha
- Pulp wood, m³/ha

**Removal, collected as energy wood, m³/ha**
- Stem, commercial wood
- Stem, waste wood
- Branches, living
- Branches, dead
- Stumps and root
4. Navigation and guidance

Control Panel of MOTTI stand simulator

New simulation:
- start a new simulation of the same stand

Initialize new stand:
- choose a new stand for simulation

Close:
- closes Motti session

Help

Manual:
- You can open the User's guide in pdf-format from here.

WWW-site:
- You can open the homepage of MOTTI-software from here (www.metla.fi/metinfo/motti/).
4.1. New simulation

You can start a new simulation after the previous one is final cutted.

The previous simulation will be discarded if not final cutted when you launch a new simulation.

Motti will ask for confirmation.
4.2. Initialize new stand

If you choose another stand to be simulated the current results will be erased.

Motti will ask for confirmation.

Initialization of a new stand will remove previous simulations. Do you want to proceed?