



# TRESTIMA Stack Measuring System

User guide (v.4.3)

## Table of contents

1. How TRESTIMA stack measuring works .....	3
2. Usage .....	3
2.1. Start the application and login .....	3
2.2. Type in the measurement name / identification .....	4
2.3. Capturing a stack sample image .....	5
2.4. Measuring a stack.....	6
2.5. Measuring a long stack (e.g. roadside) with several samples .....	9
2.5.1 Using stack divider aid lines.....	11
2.6. Results .....	12
2.7. Stack sample page .....	13
3. Stack options .....	14
3.1. Stack options from the web .....	15


## 1. How TRESTIMA stack measuring works

TRESTIMA stack tool measures the volume of a stack from images taken using a smartphone or a tablet device. To use the tool you will need preferably a high-end tablet computer (such as Sony Xperia Z2 Tablet), TRESTIMA yardstick and a valid TRESTIMA stack measuring account.

Measuring a stack is a **four step process**: **1)** First an image of the stack is captured after which **2)** the user needs to input the outer boundary of the stack, **3)** as well as the end points of the yardstick. Lastly **4)** the average length of the logs in the stack (i.e. stack length) needs to be measured and inputted by the user. After these steps the data sample is automatically sent to TRESTIMA cloud for analysis and the user is presented with a preliminary result of the volume (frame / gross volume). Meanwhile the sample is being processed by the TRESTIMA log stack server which enhances the stack boundary and returns a full report along with an estimation of the average log diameter. The images and the results are saved to TRESTIMA cloud service so that later examination of the result is easy and always available.

## 2. Usage

### 2.1. Start the application and login

- Launch TRESTIMA by clicking the icon: 
- Application opens and asks for credentials
- Type in your log stack TRESTIMA –credentials and “Sign in”

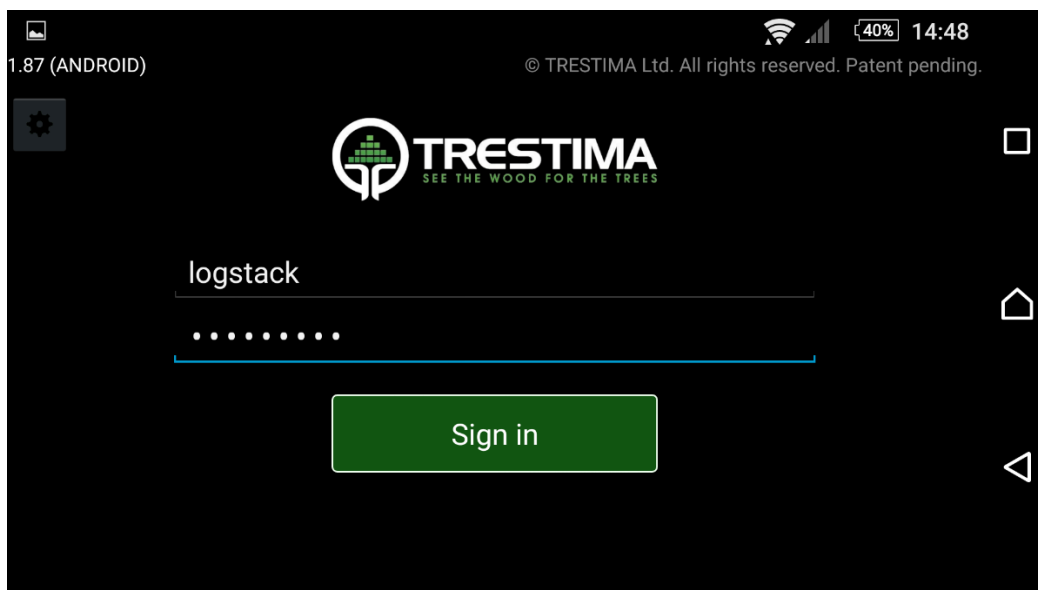


FIGURE 1 LOG IN SCREEN

In case this the first time you login to the application, an online network data connection is required. After the first successful login you can login also in offline conditions. The application remembers the credentials which have had a successful online login.

## 2.2. Type in the measurement name / identification

After a successful login a view with a map should be visible.

- Before starting to measure the stack, input stack name / identification to text field (1). *This is an important step because the **stack name** identifies the measurement.*
- Once the stack name is inputted, you can start capturing samples of the stack using touch camera button (2), in case you have a device with a camera key you can capture samples also using the camera key.
- Text/image notes can be associated with the stack measurement using (3)
- To aid stack calculation *stack options* can be inputted using the stack options button (4). See more details from a later chapter called 'Stack Options'.

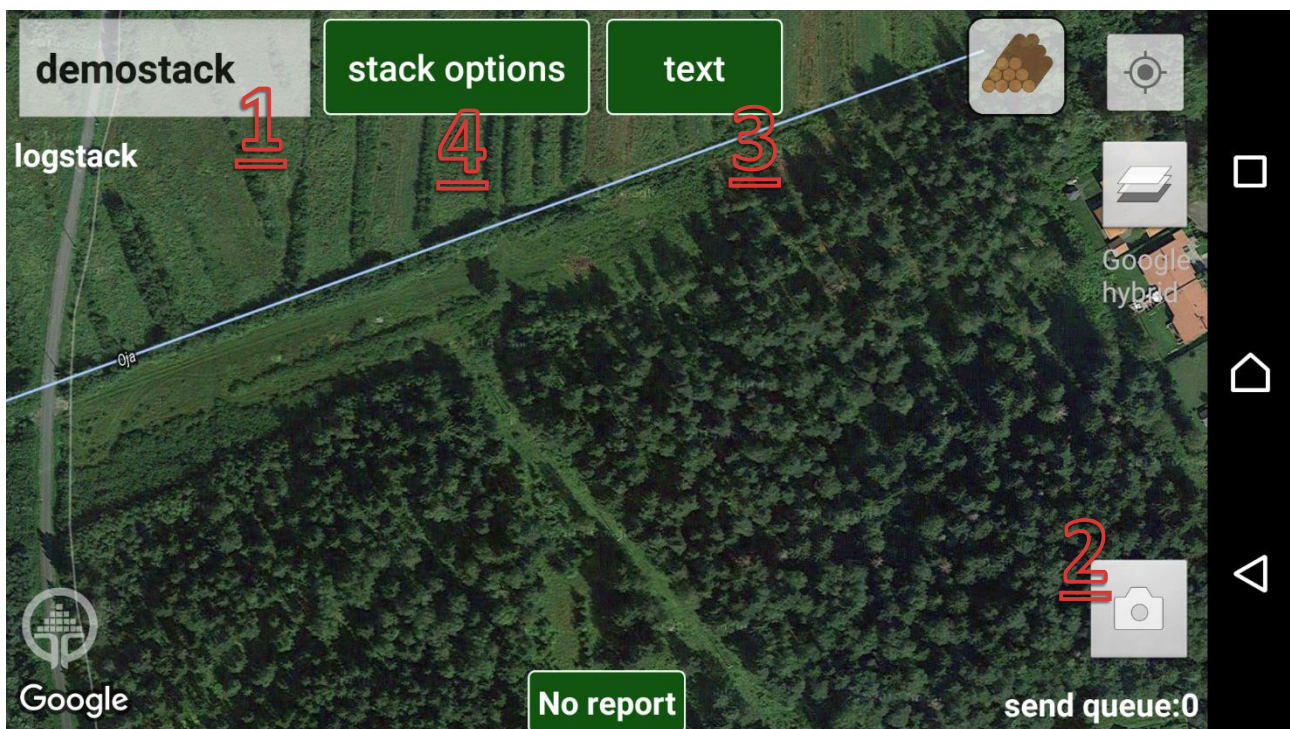


FIGURE 2 MAP VIEW

### 2.3. Capturing a stack sample image

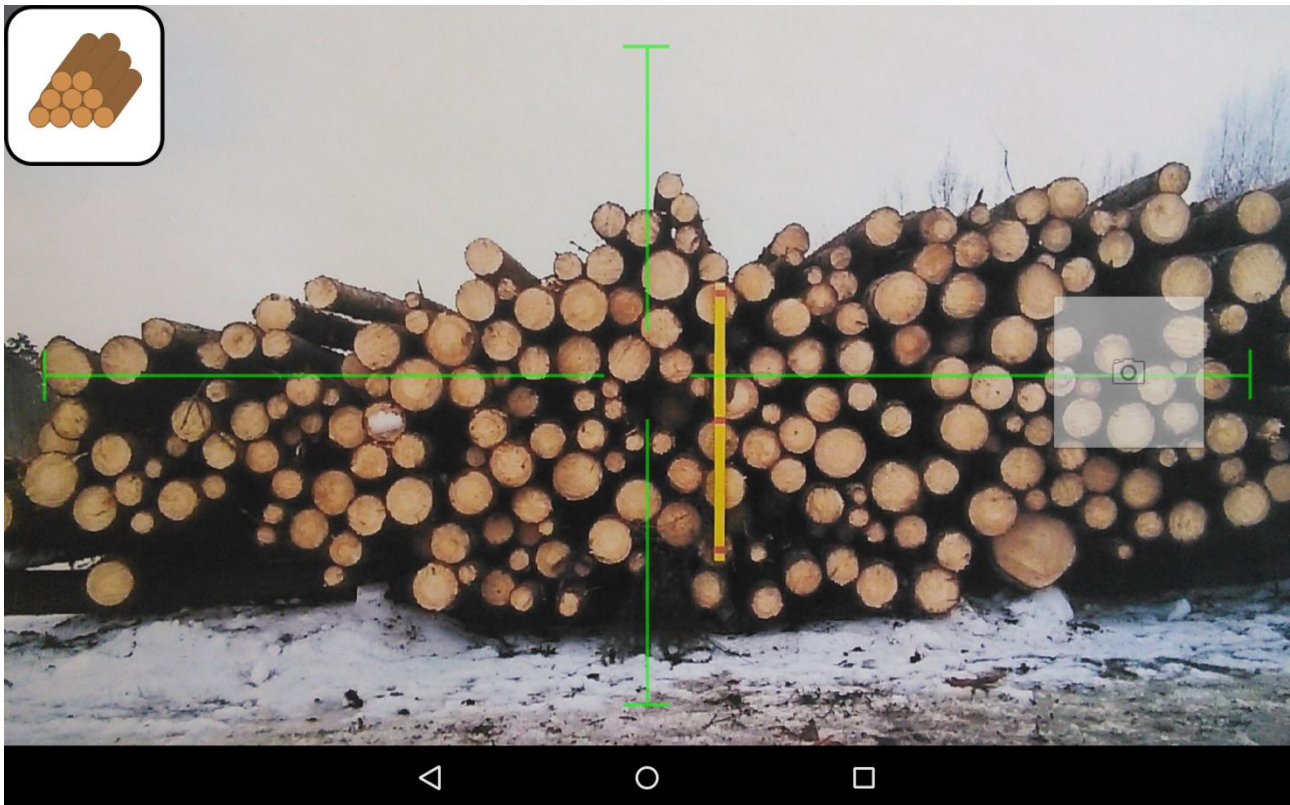


FIGURE 3 CAMERA VIEWFINDER

Once the camera touch button is pressed in the map view, a camera viewfinder opens. Things to pay attention to when capturing the image:

- Limit the image bounds so that the whole stack or the part of *stack to be measured is fully visible*
- Capture images holding the device in landscape orientation.
- The log stack icon in top left corner indicates that the device is pointing straight enough to the stack, an image should be captured only when the icon is visible to ensure that there are no perspective distortions due to the angle of the camera towards the stack.
- If possible try to point the crosshair to the yardstick
- Capture the image by pressing the touch camera shutter button on the right, *hold the device as steady as possible when capturing the image to ensure good image quality*

## 2.4. Measuring a stack

### 2.4.1. Inputting outer boundary of the stack

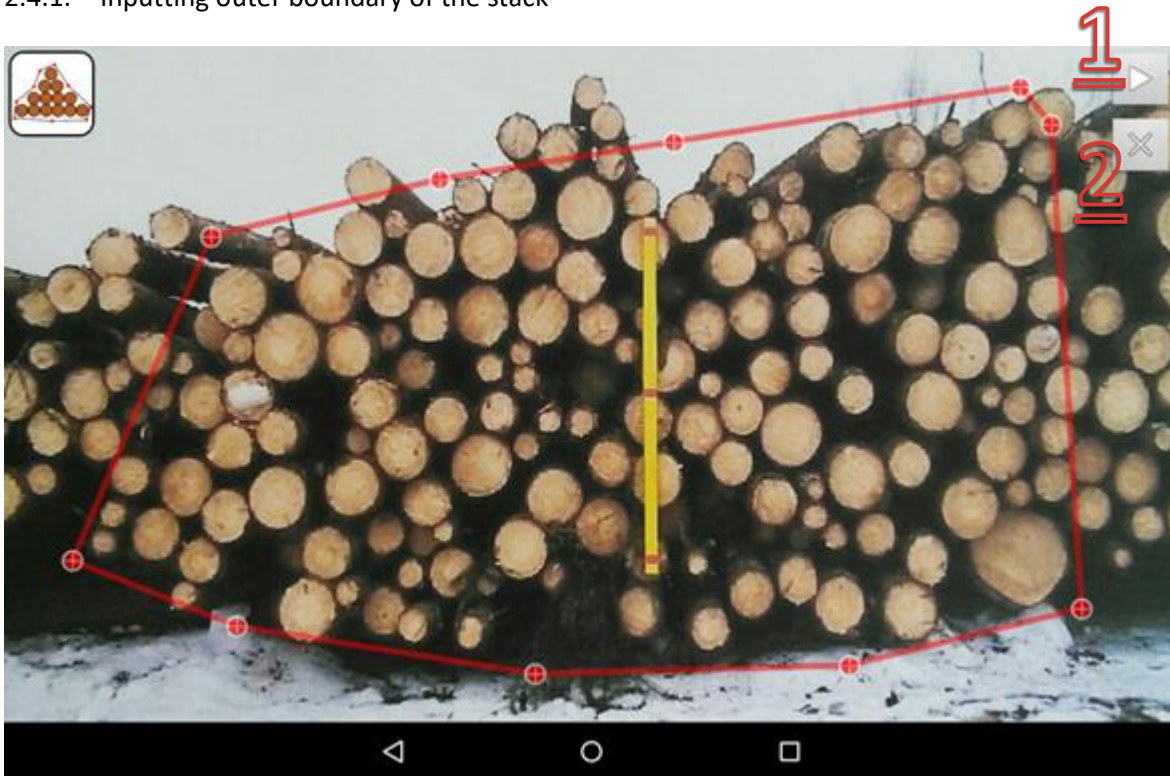


FIGURE 4 INPUTTING STACK BOUNDARY

Once the sample image is successfully captured a view with the captured image opens. If the image is not OK, e.g. it is blurry or the stack is not visible you can abandon the sample by pressing the 'X' – icon on the right (2).

If the image is OK, input the stack boundaries by tapping on the screen. The purpose of pointing out the stack boundaries is to tell the system where to measure the stack.

Every tap leaves a red circle on the screen. Insert the red circles all around the measured stack, a bit outside the actual stack boundary – the machine vision on the server will finalize the stack border. Note that a **minimum of 3 points** are needed in order to complete this step.

Once you have inputted the stack boundary press (1) to move to the next step

### 2.4.2. Inputting endpoints of the yardstick

TRESTIMA measuring system uses a known reference for measuring the actual dimensions of the pile and individual logs. This reference can be the official TRESTIMA yardstick **or any other exactly 1-meter long reference stick** that can be seen clearly from the photos. To input the endpoint circles for the yardstick simply tap the upper and lower edge of the stick. *Note that you can zoom in by using a two-finger pinch gesture*, to allow more easy and precise insertion of the green yardstick endpoints. Also make sure you have exactly two yardstick endpoints inputted, otherwise the data is not valid for sending. Yardstick points can be moved around precisely by dragging them with one finger. Short tap will delete the point.

**NOTE:** As of mobile version **1.87** marking endpoints of the official red & yellow TRESTIMA yardstick is an *optional step*. If the endpoints are marked, the system can provide the result more quickly. If the step is skipped without inputting endpoints it is still very important to take care that the stick is clearly visible in the center part of the image. For any other reference sticks it is still mandatory to mark the endpoints.



FIGURE 5 MARKING YARDSTICK END POINTS

Move to next and final step by pressing *next* button (1).

### 2.4.3. Inputting stack length

As a final step use the buttons on the center of the screen to input the average length of the logs. If the logs are cut to a default length by harvester it's easy to use the same length here. Otherwise select a number that represents the average log length of the whole pile.



FIGURE 6 INPUTTING THE STACK LENGTH

Once the stack boundary, yardstick endpoints and the stack length are OK, *send the sample for processing by pressing the send sample icon (1).*



## 2.5. Measuring a long stack (e.g. roadside) with several samples

If you have a longer stack then you need to take several images for it to cover the whole stack. The images are taken exactly the same way as with the smaller stacks.

The only thing you need to pay attention to is dividing the stack between samples.



FIGURE 7 DIVIDING THE STACK

The image above shows an example of a larger stack that needs to be sampled with several images.

The red line indicates an example boundary. When starting to measure a stack with several images the user must decide the limits as indicated in the above image. After capturing the image, the red stack boundary circles should be inputted as indicated in the next picture.



FIGURE 8 EXAMPLE BOUNDARY POINTS FOR A STACK SECTION

As it can be seen in the above image, the limit of the sample is indicated with a straight vertical line (*should be as close to 90 degrees as possible*). Also, do not use more than 2 points to create the limiter boundary; use one point to the upper part of the stack, and one point to the bottom part of the stack. Take as many images as you need until you reach the end of the stack.

You should keep in mind where the previous measuring area ends and where to start the next one in the next photo. To aid this, you can use a stick or other object to mark the point where the vertical divider line goes. This way it is easier to frame the next photo and place the red vertical line in photo.

### 2.5.1 Using stack divider aid lines

TRESTIMA Mobile application version 1.85 added stack divider aid lines functionality for making it easier to input the stack dividers.

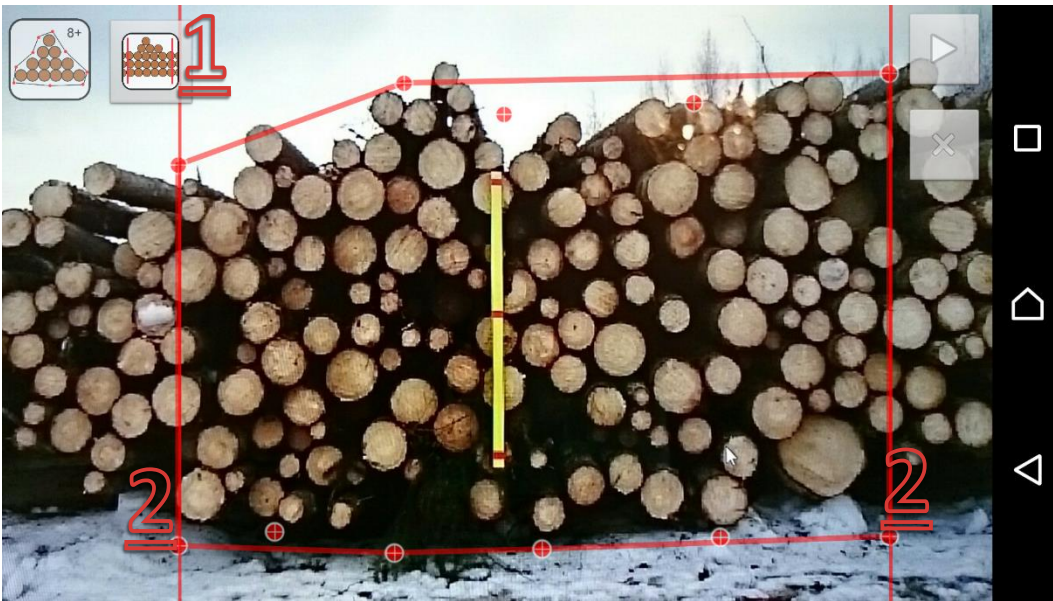


FIGURE 9 STACK DIVIDER AID LINES VISIBLE

The above figure shows stack divider aid lines (2). The divider aid lines can be toggled on and off from the button in the top left part of the screen (1). *Note that the aid lines are a visual aid, and they are only shown to help inputting the boundary points in a consistent manner and in a 90-degree angle if that is desired.*

If the stack divider lines are visible, inputting boundary points near the line will 'snap' the boundary point to the line. This makes it easier to create straight vertical divider lines.

## 2.6. Results

Once a sample reaches the server the server processes the sample and creates the final report of the sample(s).

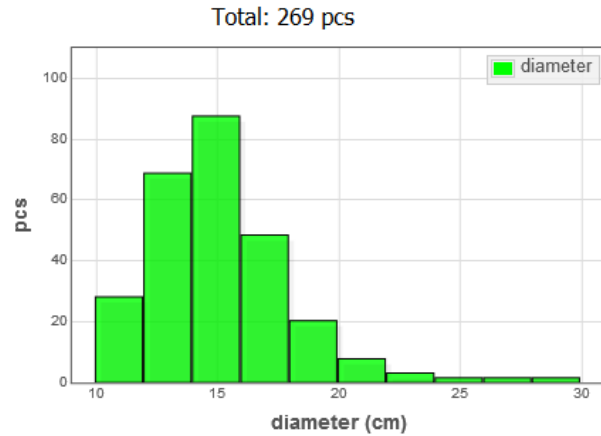
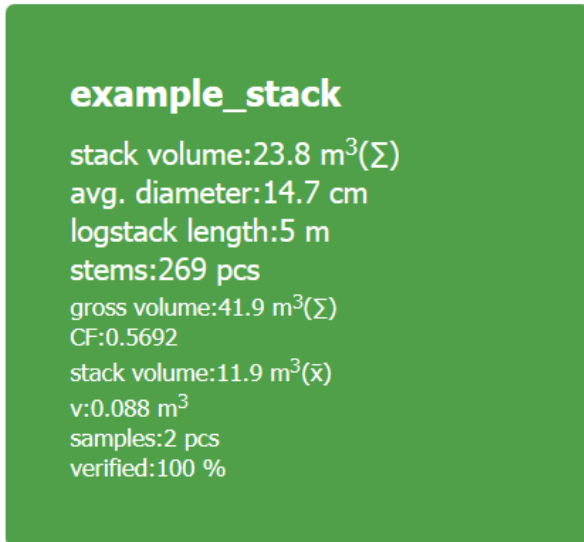


FIGURE 10 EXAMPLE STACK REPORT PAGE IN TRESTIMA WEB SERVICE

The report is available in both the web service and mobile client if there is online connection available.

The example report has 2 samples. There are two wood volumes in the report – an average from all of the samples and a sum volume of all of the samples. In addition to wood volumes there is a gross volume which is the volume of the stack boundaries. The wood volume is calculated by multiplying the gross volume with the volume coefficient factor (CF). More information about volume calculation can be found from *TRESTIMA Stack volume calculation manual*.

The stack report page shows the stack report, diameter distribution, stack length and provides access to the individual samples.

If you take several images of a stack that fits to one image, you can use the sample result averaging to get more accurate result. The sum result is meant for longer stacks where you usually take several images of the same stack. In that case the sum result represents the stack volume.

## 2.7. Stack sample page

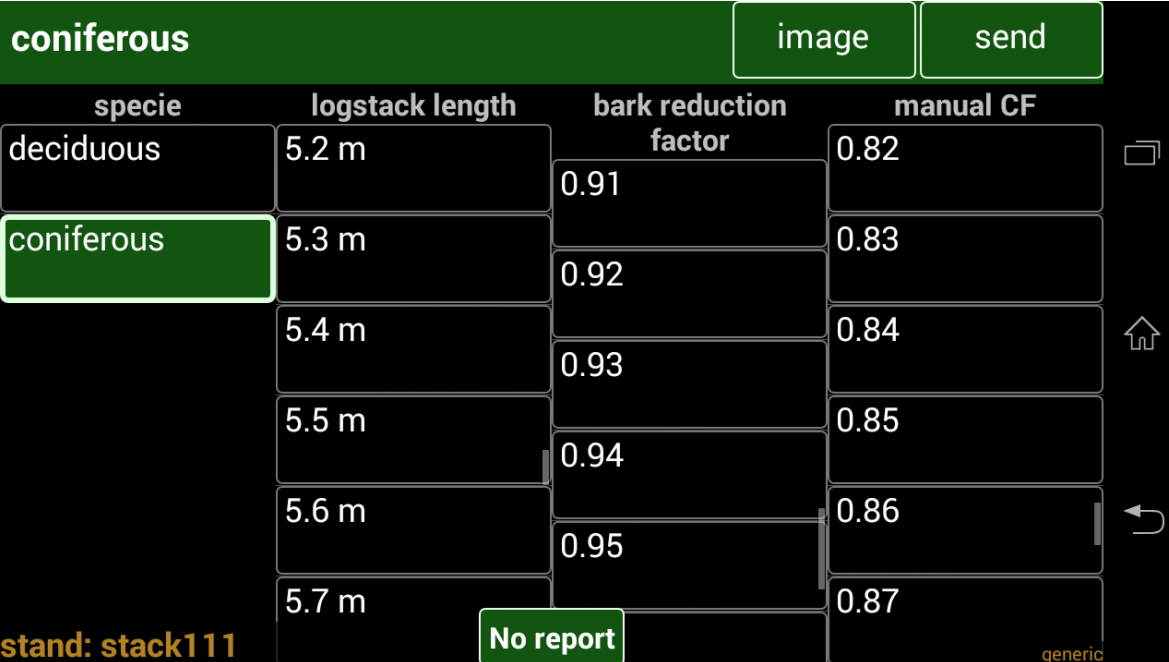
You can view each stack sample and see the individual result for each sample. If you do not want to use the sample in the calculation you can **'Disable'** the sample. Also larger image of the sample is available from the **'Full Image'**-button



FIGURE 11 STACK SAMPLE PAGE

### 3. Stack options

To input stack options click on the 'Stack options'-button in the map view. Stack options are used for providing more details for the volume calculation.



coniferous				image	send
specie	logstack length	bark reduction factor	manual CF		
deciduous	5.2 m	0.91	0.82		
coniferous	5.3 m	0.92	0.83		
	5.4 m	0.93	0.84		
	5.5 m	0.94	0.85		
	5.6 m	0.95	0.86		
	5.7 m		0.87		

stand: stack111      No report      generic

FIGURE 12 STACK OPTIONS INPUT VIEW


From the stack options view the following items can be inputted:

- **Specie**, or rather 'specie group'. Setting the stack to either to coniferous or deciduous will calculate the result using the formulas specific for these specie groups. *It is recommended to always specify the specie to enable the use of correct formulas for the stack in question.*
- **Stack length**, even though the length is inputted with each sample, the length can additionally be inputted from here. Note that all length inputs are averaged.
- **Bark reduction factor**, if you need to report the volume without bark, you can input the bark reduction factor which will be used to reduce CF.
- **Manual CF**, this can be used to override all the automatic CF calculations

Press 'send' after you have done the selections to send the setting to the web service.

### 3.1. Stack options from the web

To make the usage easier in the office the stack options can be inputted from the web page as well.

To input stack options from the stack's page click the  button open the menu. The button will open the stack options.

#### Example\_stack

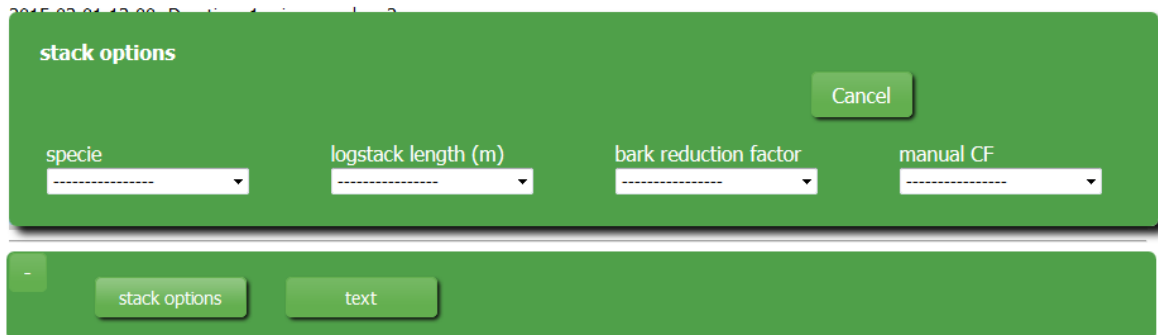


FIGURE 13 INPUT STACK OPTIONS FROM THE WEB PAGE

You can input all the same options from the web as you can from the mobile client. This makes it easier to do the final adjustments for the stack.

If needed, you can remove the inputted items from the stack inputs list by marking the item and pressing red 'X' button.

- Observations: 2 pcs		Move	X
1	logstack length:5.0 m	<input checked="" type="checkbox"/>	
2	logstack length:5.0 m	<input type="checkbox"/>	

FIGURE 14 STACK INPUTS LIST