



The Smart Forest Management



User's guide SmarteloPortable VNU v2020.1

SmarteloPortable VNU has been developed in the context of the BioEcoN project
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Welcome to Smartelo

One of the most important decisions in forest management is signaling. At this stage, the number and type of trees that will remain standing (and, conversely, those that will be harvested) are determined, so as to improve the state of the forest, incorporate the criteria for conservation of biodiversity and ensure sustainable use of the forests.

Over the last few years, different forest marteloscopes have been created throughout Europe. These are forest areas in which all the tree species that make them up have been notated, measured, numbered and spatially located. Some of the main applications of the marteloscopes are focused on the practice of signaling and improvement in decision making (professional field), estimation of tree and stand variables (educational purpose), the carrying out of research projects and the dissemination and transfer of sustainable forest management projects (social purpose), among others.

Directly related to these objectives, Smartelo is composed by two apps:

1. **Smartelo PC:** An app that manages the large amount of data from marteloscopes and allows obtaining and making available different results (dendrometric, economic, ecological) from each one of them for the improvement of decision making in this important activity.
2. **Smartelo Portable:** Adaptation of Smartelo PC that allows the users to carry out forest marking activities in situ by means of an application adapted for mobile devices, in which real time information is obtained about the signaling status based on the forestry objectives pre-established by the user.

The design and interface of Smartelo allows the user to work with it as a general forest information manager, since the main source of information it handles is the forest inventory. That is why this tool has research application in areas such as sustainable forest management, education, exploitation of forest resources, wood transformation industries, climate change, renewable energies (biomass) or valuation. Smartelo aims to introduce new technologies in the forestry sector and related areas.

This guide has been developed with the aim of indicating the use of the main functions of Smartelo Portable, focusing on the Teams spreadsheet.

1 Name: 14/2/20

2 Teams

3 Quadrant

Tree	Reason	Quadrant	Species	Vol(m ³)	Sn(m ²)	Age(t)	q(t)	CO2(t)

4

SELECTION OBJECTIVE		Quadrant	Density
%	Absolute value		
20%			

5

CURRENT	
%	Absolute value
0,0%	

Quadrant	Start		Density				Remaining	
	Trees	Trees/ha	Trees	Trees/ha	%cell	Trees	Trees/ha	%cell
Total	17,00	272,00	0,00	0,00	0,00	17,00	272,00	1,00
<i>Acacia mangium</i>	10,00	160,00	0,00	0,00	0,00	10,00	160,00	1,00
<i>Eucalyptus camaldulensis</i>	2,00	32,00	0,00	0,00	0,00	2,00	32,00	1,00
<i>Acacia auriculiformis</i>	4,00	64,00	0,00	0,00	0,00	4,00	64,00	1,00
Died	1,00	16,00	0,00	0,00	0,00	1,00	16,00	1,00
<i>Serina stamea</i>	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Marteloscope	Trees	Trees	Trees	Trees	%cell	Trees	Trees	%cell
Total	507,00	0,00	0,00	0,00	0,00	17,00	17,00	0,03
<i>Acacia mangium</i>	305,00	0,00	0,00	0,00	0,00	10,00	10,00	0,03
<i>Eucalyptus camaldulensis</i>	15,00	0,00	0,00	0,00	0,00	2,00	2,00	0,13
<i>Acacia auriculiformis</i>	109,00	0,00	0,00	0,00	0,00	4,00	4,00	0,04
Died	55,00	0,00	0,00	0,00	0,00	1,00	1,00	0,02
<i>Serina stamea</i>	18,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Number	Selection Reasons				
	1	2	3	4	5
Reason	Forked	Plagues	Replacement	Twisted	Exploitation

The main sheet of Smartelo Portable is called **Teams**. This sheet allows the user to perform a forest marking activity in the marteloscope and keep track of the activity in real time based of a pre-defined silvicultural objective. Team sheet is composed by:

1. Team/Operator name and date of the marking activity

The name of the person or team that will make the proposed marking must be written. The working date is automatically calculated by Smartelo, so it is not necessary to complete it manually.

2. Quadrant

The number of the quadrant we are working on must be indicated. Once we've written that number we'll see that the table on the right (6) is automatically updated with the data from it. If you want to work at a marteloscope's scale, you should indicate "All".

3. Selected trees

It is the table where we will have to introduce the numbers of the trees that we want to select. Remember that each tree in the marteloscope is identified with a plate containing the number assigned to that tree in the inventory.

In addition to the tree number, you must indicate the reason for selecting that tree.

As we select trees, this table will be completed automatically, so that we can see to which quadrant and species the selected foot belongs, as well as the value of the volume (in m³), the normal area (in m²), the aboveground biomass, carbon and CO₂ (in t) of the same.

At this point it is important to highlight two important features of Smartelo Portable:

- During the tree selection process, it is likely that we will mark a tree that does not belong to the working quadrant, or that we will move to a different quadrant than the one indicated in the Quadrant box. In this situation, Smartelo will indicate in red the selected tree, if it is outside the working quadrant.
- Another situation that can occur is the repetition of selected trees. It is possible that in the course of our marking task, we mark a tree that we have already marked before, but had not noticed. Smartelo will indicate this repetition by marking the duplicated tree in yellow. In this way, we will detect in real time which foot or tree we have selected in duplicate to proceed with their elimination.

4. Selection objective

One of the main functions of Smartelo Portable is the control of the marking activity status in real time. What does this mean? This means that you can set a certain silvicultural target and knowing in situ and at the moment how close or far I am from meeting that target. Smartelo offers us the possibility of defining this silvicultural objective (selection objective) in 12 different ways, which are listed below:

- Entering the selection objective as the absolute value of the following variables:

- Density (N), in trees/ha
- Volume (V), in m³/ha
- Basal Area (BA), in m²/ha
- Aboveground biomass (AGB), in t/ha
- Carbon, in t/ha
- CO₂, in t/ha

- Entering the selection objective as a percentage of the following variables:

- Density (N), in % of the total
- Volume (V), in % of the total
- Basal Area (BA), in % of the total
- Aboveground biomass (AGB), in % of the total
- Carbon, in % of the total
- CO₂, in % of the total

5. Objective control

As we advanced in the previous point, Smartelo Portable allows to know the status of the signaling in real time. As we are selecting feet, Smartelo will calculate the absolute value and percentage of selection and or will update automatically.

These values will be compared with the silvicultural target set in the Selection Objective box, and it will indicate the signaling status by means of a colored rule.

In this way, Smartelo will indicate by means of three colours which is the status of the signalling according to the following:

- Green color: The absolute value or percentage of selection is far from reaching the set selection target. It is recommended to select more trees to approach the target.
- Yellow: The absolute value or percentage of selection is close to reaching the selection objective.
- Red: The absolute value or percentage of selection has exceeded the forestry objective. It will be necessary to remove trees from the tree selection list in order to reduce this value and meet the objective defined at the beginning of the marking.
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6. Smartelo Portable Control Panel. Activity tracking

The control panel of Smartelo Portable indicates the status of the signaling in real time. This panel is automatically updated with each foot included or excluded in the tree selection table (3).

All the information related to signaling is processed internally by Smartelo thanks to the inventory and classification of the marteloscope that we have included in previous stages.

This control panel summarizes all the signaling information based on the six main stand variables Smartelo works with: Density (N), volume (V), basal area (BA), aboveground biomass (AGB), carbon and CO₂. For each variable and species present in the marteloscope, Smartelo will show us the evolution of the signaling according to:

- Initial situation: Values of stand variables by species, prior to the start of marking
- Harvested: Values of stand variables by species derived from the selected trees
- Remaining: Values of the stand variables by species of the trees still to be selected in the quadrant (Initial situation - Harvested)

Smartelo offers the above data taking as a reference both the study quadrant and the whole marteloscope.

7. Selection reasons

Every tree is selected for a reason. There is a great variety of reasons to select a tree (economic, ecological, singular...etc), and Smartelo allows you to characterize the selection of the tree with a categorical variable, whether this is the reason or the reason for the selection. In this first version, Smartelo comes by default with a total of 5 selection reasons, which can be edited by the user.

Remember that in the tree selection table (3) it is necessary to indicate both the number of the selected tree and the reason for its selection. This point is important in order to obtain the most complete evaluation of the marking possible in later stages by using the desktop version of Smartelo.