Using An Automatic Camera Attached to Minidisk Infiltrometer to Improve Measurement in Disturbed Soils

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Improving the Methodology

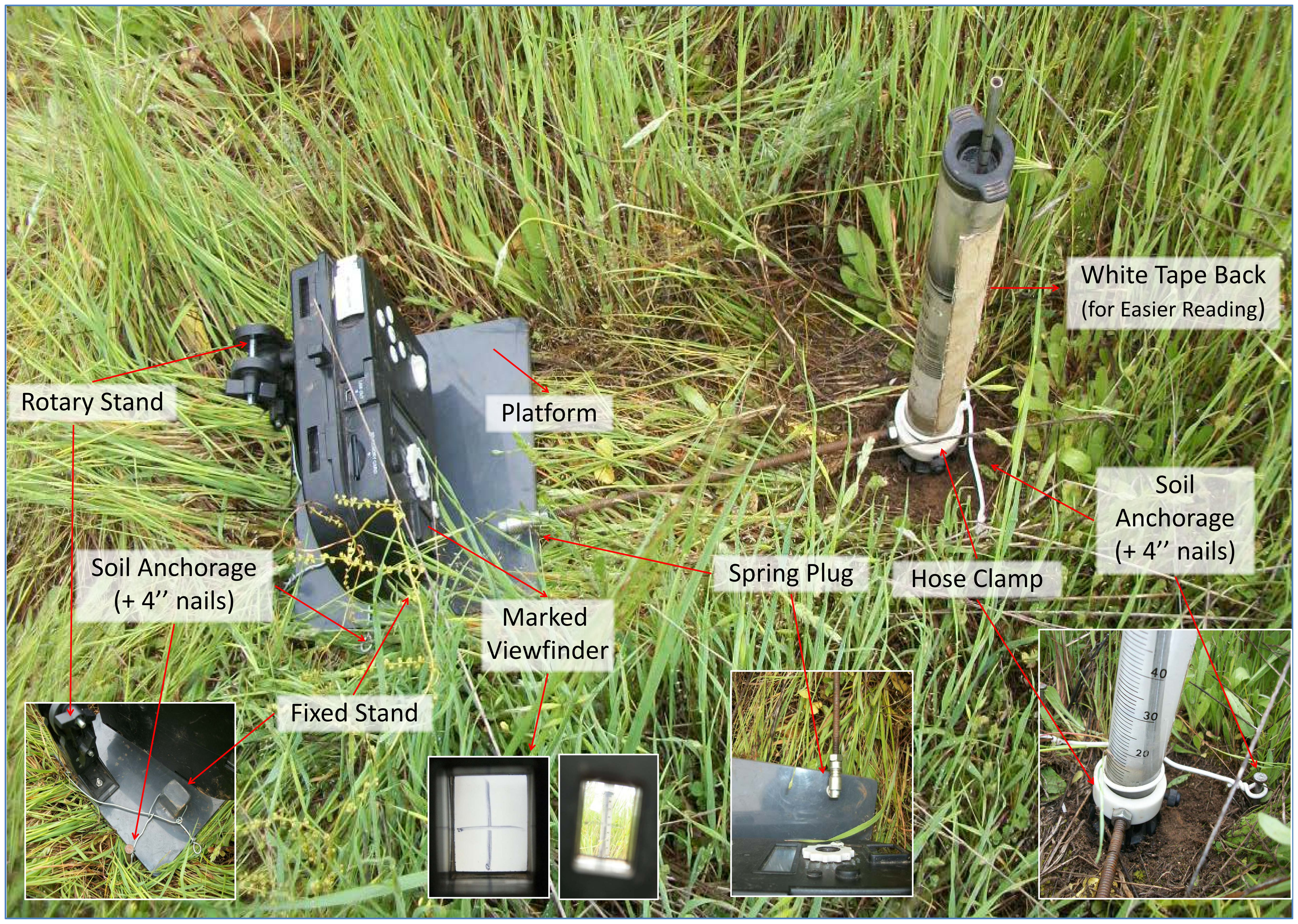
Known methods to measure **infiltration rates** produce major disturbances in soils, and may become impractical in dry clayey or stony soil.
The **minidisk infiltrometer** (Decagon Inc.) does not produce cracks in the soil and works on any soil. It is a low water consuming portable device and comes with a spreadsheet to make all calculations easier.

The **time lapse camera** attached to the minidisk infiltrometer takes a photo of the water height allowing **more accuracy** and **saving the observer's time**.

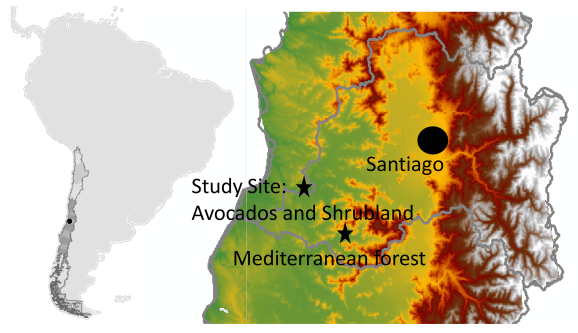
Methodology in Practice

Infiltration is related to the pore structure of soil, and affects root exploration and nutrient flow, among other soil properties. Many soil quality assessments include this parameter.

Under the scope of **land use change,** soil quality assessments may focus on the **capability of soils to stabilize carbon**. One related soil function is to resist soil erosion, and infiltration is a key parameter since allowing water entrance decreases run-off.



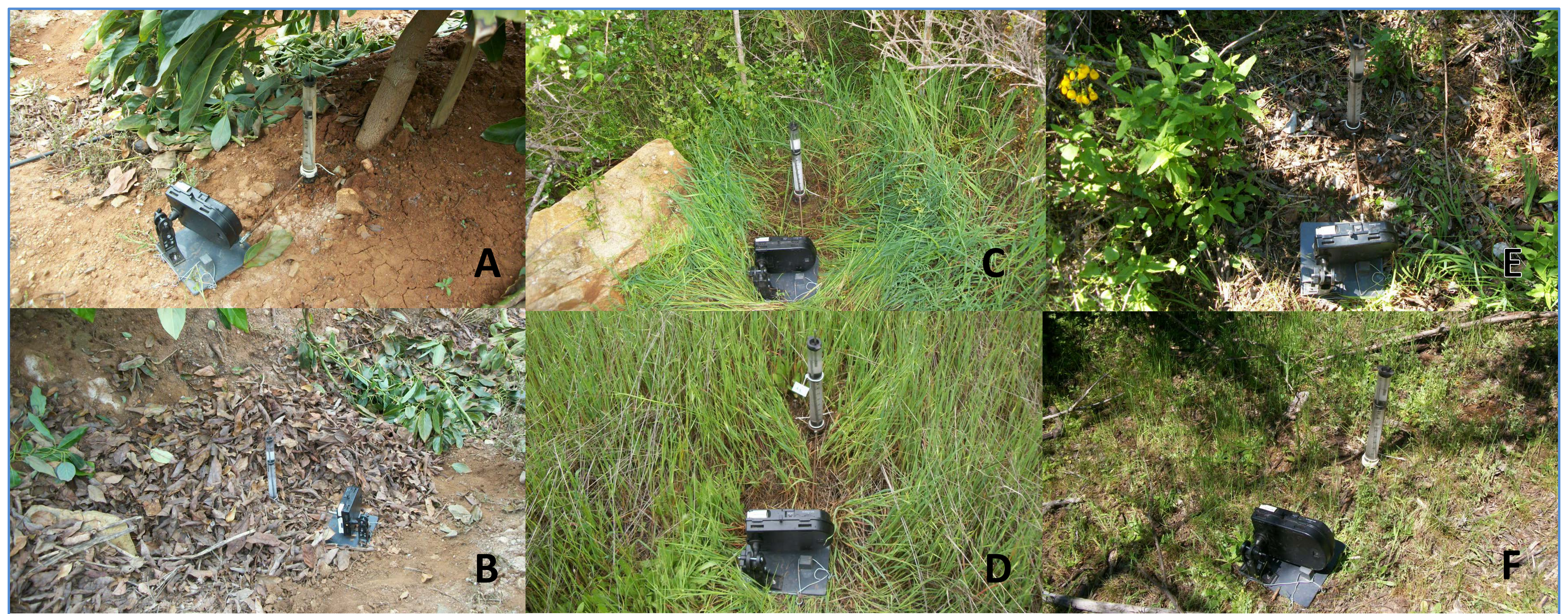
The Case Study



In **central Chile** the land use change is widespread. In the last decades thousands of **hectares of native forest have been replaced** by agricultural crops in **high steep soils** of the coastal range*.
A **soil quality model** assesses the impacts of converting shrubland to avocado orchards. A reference forest soil was included. **Infiltration was measured in the three uses: avocado, shrubland and Mediterranean forest**.

*For further information on the study and study site see (SSSA Meeting 2011)
http://a-c-s.confex.com/crops/2011am/flvgateway.cgi/id/12999?recordingid=12999
http://a-c-s.confex.com/crops/2011am/webprogram/Paper68139.html

Images: Up center, study site map. Right, the study site: avocado orchard with shrubland patches. Left, Mediterranean forest.



Images: A, avocado bed. B, avocado furrow. C, shrubland under canopy. D, shrubland outside canopy. E, forest under canopy. F, forest outside canopy.

Infiltration Rates in Three Land Uses: Avocado, Shrubland and Forest

The figure 1 shows infiltration curve for the three uses. Dotted lines show mean, and plain lines show mean ± one standard deviation. Notice the high variability for these soils. The figure 2 shows the saturated hydraulic conductivity for the three soils. This parameter was calculated using the spreadsheet by Decagon Inc* (figure 3). Conductivity is significantly lower only for shrubland, probably due to compaction by grazing in previous decades.

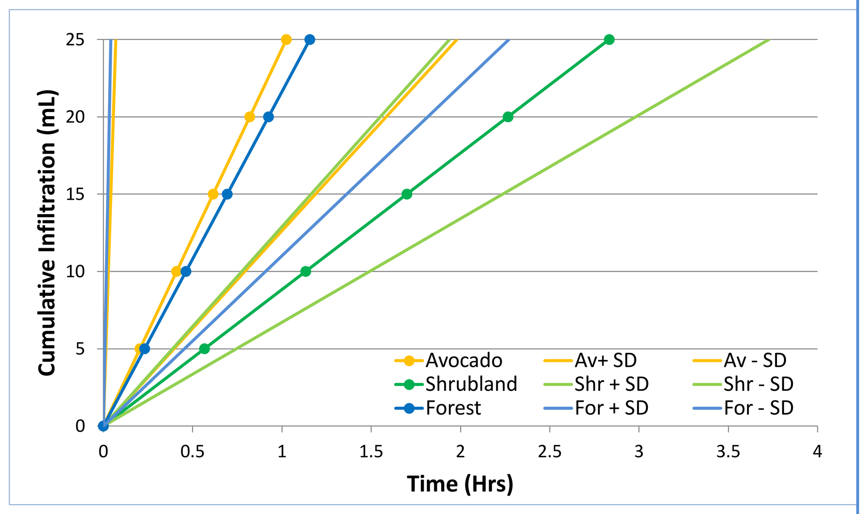


Figure 1. Cumulative infiltration for three land uses. Calculated as the average time needed to infiltrate certain amount of water, for every use. Dotted lines show the mean, and plain lines show the mean plus and minus one standard deviation.

	N	Kfs (cm/s)
Avocado	5	0.000326 ± 8.94E-05
Shrubland	6	0.000078 ± 1.56E-05*
Forest	6	0.000317 ± 7.84E-05

Figure 2. Saturated hydraulic conductivity for three land uses. Coefficients are presented with standard error. Shrubland conductivity is significantly different from the other uses.

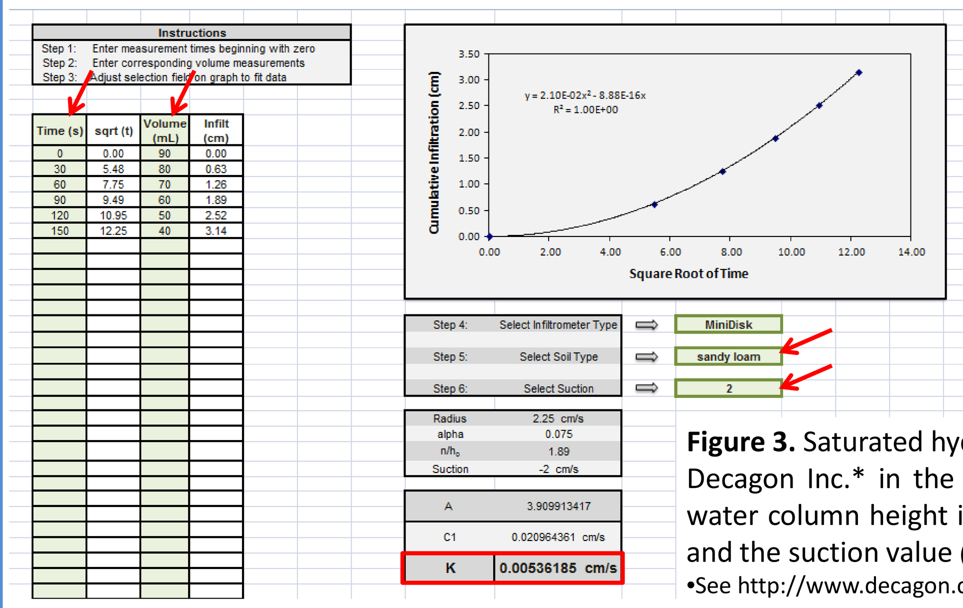


Figure 3. Saturated hydraulic conductivity calculations using the spreadsheet delivered by Decagon Inc.* in the web page of the Minidisk Infiltrometer. Enter data for time and water column height in the rows in the left side of the spreadsheet, select the soil type and the suction value (2 is a default "multipurpose" value), and get the conductivity instantly.
•See http://www.decagon.com/support/new-mini-disk-infiltrometer-macro/ for more information