

## Recording protocol – *Pinus sylvestris*



**Note on selection of trees to record:** Every tree is welcome, but please try to target:

1. **Five trees in one location** (if you cannot manage five, any number will do, all the way down to only one, but five is best!). Please, avoid sampling adjacent trees.
2. **Trees that have seeded and grown naturally** (again, if you are uncertain of the origins of your tree, any record is better than none).
3. **Trees that you can label or mark permanently**, in case you or someone else need to find the tree again to take additional measurements or for a second recording.

**For each tree please record of the following traits as possible.**

We prefer to have complete records, but as some traits need more time and specialisation to measure, you can also limit your recording to those traits you can measure rapidly.

We would also like to have records of the same tree at different time periods: you can add multiple records for the same trees using the “Add a new record for this tree” option on the data entry webpage.

1. **Date of record: Date of the observation.** This field is mandatory.

2. **DBH (cm): Trunk diameter at 1.30 m**, i.e., approximately at adult breast height.

If the tree has more than one trunk, please measure all of them and record the average (but try to avoid trees with many small trunks). Note that tree is multitrunk in Notes.

If the tree is leaning, measure DBH perpendicular to the tree trunk. To obtain DBH, measure the circumference of the tree and compute the diameter from that value (i.e. divide by  $\pi$ ,  $\sim 3.14$ ).

For more details, a graphical representation and special cases see [https://en.wikipedia.org/wiki/Tree\\_measurement#Girth](https://en.wikipedia.org/wiki/Tree_measurement#Girth)

3. **Number of fruits (units): Cones (the conifer structure equivalent to a fruit) are counted from the ground using binoculars.**

Please, provide the average of three rounds of counting. Each round of counting consists in the number of cones that you are able to count in 30 seconds.

Make sure you count only mature (brown) and closed cones, i.e., those that contain seeds, and not immature (green) or open cones that have already dispersed them (open cones often stay on the branch for several years after seeds are dispersed).

4. **Seed mass (g): Seed mass is the oven-dried mass of an average seed.**

To estimate seed mass, collect 10 mature cones and place them in a dry paper bag; place the bag in a warm place until cones have opened, then shake out all seeds and mix thoroughly so seeds from multiple cones are mixed. Select 100 viable seeds (if in doubt about viability, place seeds in water and remove any that float). Remove seed wings. Then dry the seeds and weigh.

5. **Tree age (years): Age determination is very important** for comparing trees growing in different environments.

In conifers, such as Scots pine, you can estimate tree age by counting whorls (see, e.g. <http://articles.extension.org/pages/33763/tree-growth>).

When counting tree whorls, please notice that one year's growth may have been lost due to insect attack or that in some years trees undergo two growing phases separated by a resting period (often the first growth is larger than the second).

If the tree is big and has lost its lower branches (self-pruning), then to estimate total age, it is necessary to add to the whorl count the time taken to grow to the first whorl still present. To do this, observe as many young trees as possible in the neighbourhood of the tree being recorded and produce an estimate of the time they took by averaging their whorl counts to the height of the first whorl still present on the recorded tree.