

REPLICATION ACTIVITIES MONITORING PROTOCOL

Seedling characterization

In order to characterize the planting material used we propose to measure shoot and root length, and seedling base diameter, in a random sample of 10% of the total seedlings per specie (a minimum of 10 seedlings per specie). The measures should be taken using a measuring tape/stick (height) and a caliper (diameter), as soon as possible after the reception of the seedlings, before the planting process.

Moreover, a qualitative evaluation of the seedlings must be done. This evaluation allows detecting shoots and roots health problems (insects, diseases, chlorosis, loss of leaves, stem scars, rotten roots). Moreover, we must pay attention on the presence of spiralized roots or J-rooting. If any of these problems (or others) are detected they should be noted.

The type and dimensions of the containers, and the nursery where the seedlings proceed must be recorded too.



Evaluation of Ficus carica and Olea europaea planting material. Appropriate root structure in F. carica seedlings (left). Bad root development in the container can explain future problems in root growth (right).

Plant vigor

Tree/shrub vigor is a health indicator, also giving insights on survival rates. Survival rates during plant establishment in the first year can mainly be attributed to the Cocoon. Survival rates in subsequent years may clearly also be affected by extreme drought or other factors like grazing and fire, all beyond the scope of the Cocoon. Vigor is assessed by the following semi-quantitative scores during their normal growing period:

3: Healthy seedling, with more than 75% of green, not wilted leaves. Also active growing points (apices) may be visible

2: Affected seedling, with 25-75% of the leaves being wilted, yellow or brown

1: Severely affected seedling with less than 25% of the leaves being green (i.e. the majority wilted, yellow or brown)

0: Presumably dead seedling with no or only wilted leaves. Seedlings, however, may still recover by resprouting after a rain event

R: Resprouted seedling



Tree seedlings in different health states, according to the proposed scores: healthy seedling (left), affected seedling (center) and resprouted seedling (right).

Vigor measures will be taken in all the seedlings after the first summer. However, in order to detect resprouting and do not overestimate mortality ratios, it is recommended to do the plant vigor measures also at the end of spring.

When possible a minimum of 10 seedlings per specie will be planted without Cocoon, which will be considered as controls, in order to better evaluate the Cocoon effect. All controls will be planted and monitored at the same time and in the same conditions than Cocoons.

Cocoon devise assessment

In order to detect problems related to deficient installation, failures or limitations of the device, a Cocoon devise assessment will be done one month after Cocoon installation. Symptoms of deficient installation as Cocoon outstanding from soil surface, incorrect fulfill of holes (space between Cocoon and soil walls), turned Cocoon or an excessive fulfilling of seedling holes must be recorded. Moreover, failures or limitations of the device as early lip collapse, broken bowl, protector fall or protector loss must be recorded. In a selection of at least 20 Cocoons per site, the water content in the bowl will be measured using a measuring stick.



Symptoms of deficient installation or devise limitations or failures: Cocoon outstanding from soil surface (a); incorrect fulfill of holes (space between Cocoon and soil walls) (b); excessive fulfilling of seedling holes (c); lip collapse (d); protector fall (e); protector lost (f).