

## Cribwall Krainer

### General characteristics

Gravity wall made of a cellular structure with logs and living stakes or plants in container with the objective that the future development of the plant substitute the logs structure. This technique is used in the stabilization of slopes until gradients of 60° as a contention wall.

### Technical characteristics

This structure of woods made of a cribwall of trunks (trunks of peeled conifer, chestnut...) has a space between trunks which is filled with ground and where the living stakes or plants in container are planted and in the frontal of it stands a fascine to retain the soil. This fascine has also an important role to retain moisture. The logs are secured with nails or steel bars.

It can use any type of wood but hardwoods with a slow degradation are more recommended.

Depending on the wood, it must be taken into account that in some cases the degradation can be very fast and therefore, there is not enough time for a properly development of the plants.

In reference to the degradation, there are studies that show that the places where the nails are driven or the rods are unit with logs are points of degradation. Therefore, it must make the minimum drilling but the necessary one in order to make that the structure works as a block.



Naturalea uses wood of chestnut (slow degradation), although if it's viable, we use wood from the area. For example an acacia tree like the robinia previously treated to prevent regrowth (is an invasive aloctone plant) works very well because the wood is hard. We must be careful with the riparian vegetation or other ones like poplars and the genus *Platanus* because of their fast degradation.

There are two major trends of how to structure the perpendicular logs: intercalated or in line. We tend to make the first system because when they rot there is not a weak line and the structure of the roots is more homogeneous.

Picture of the frontal appearance of a structure with the intercalated perpendicular sticks:



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Picture of the frontal appearance of a structure with the stick perpendicular sticks in line:

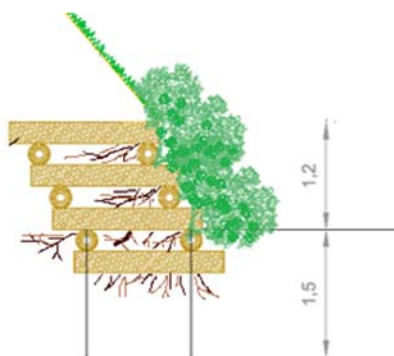


The diameter of the logs can be highly variable. We usually work with diameters of 20 to 30cm. It has to take into account that in many logs the diameter is not homogenous and must be compensate it in the construction with different diameters for keeping regular horizontal levels.

The cribwall should have a very soft slope towards the inside part. In that direction the perpendicular logs have a very important role.

The structure always needs a certain foundation depending on its location and the load it can support. In the case of constructing the cribwall in water courses, we protect the base with stone or resistant materials and we level the base below the transitory erosion level.

Part of the foundation must be directly linked to the upper structure and must allow root colonization. We have seen cribwalls on a big stone but we do not see any future.



Once the different levels of the cribwall are constructed, they are filled with well-compacted soil (without mechanical systems but avoiding air spaces). At the same time, we plant and also consolidate the fronts seen between trunks with a fascine but resistant enough to hold the ground.

The cribwalls should not have more than 2m of height. If the height to protect is higher, we can do cribwalls with terraces (always realizing the corresponding calculations). Many times, if the slope is higher, the upper part of the cribwall continues with an easier technique like the slope grid. It is basic to choose a plant of species, ecotype and quality appropriate to the area of work, because the plant is the one that will guarantee the future viability of the technique. We will not be able to replace the dead plant of a cribwall, therefore, we need to plant with high densities so that a possible plant mortality does not affect the functionality of the technique.

In the Mediterranean area and for big cribwalls, we can have a base in the water and an upper part in conditions that in summer can be arid. Therefore, we need to plant more tolerant species to drought as we go up of the cribwall.



It is very important, when is possible, to use plants from the zone, directly from the same area or preparing previously plants in a specialized nursery.

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The most resistance alive wooden cribwall is the cribwall of double wall or Krainer. But there are different variants: It can have a wall (simple cribwall) or a different volumetric structure such as Roma or Latino.



The presence of plants assures a better stability of the slope or fluvial bank, also in the successive phases once the wood has been decomposed, and the integration of the landscape is increased.

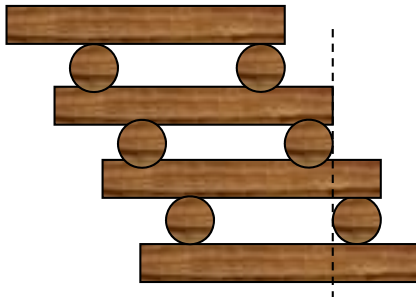


The front must not be vertical but it should have inclination in favour of the slope.

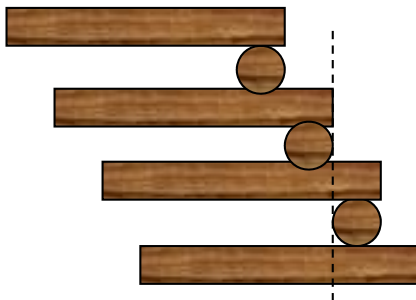
As we construct the cribwall, the parallel trunks to the current will be removed until they are aligned with the back part of the lower trunk.



### Section double cribwall or Krainer:



### Section simple cribwall:





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### Technique evaluation

Highly resistance technique for rapid stabilization of the riverbank. It is very important to choose the right plant, and use plant in forest alveolus instead of stake in areas with low humidity. It is necessary to make sure that the fascines are of a stable diameter and that they do not lose volume over the time and thus guarantee the there is no loss of soil.



*All the pictures that are showed in this document are from interventions which have been carry out by Naturalea.*