RUTA CHALEPENSIS L.

Vegetative propagation of Ruta chalepensis L., pioneer species in stony soils and limestone.

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Pioneer plants with a wide geographical distribution are an asset for soil bioengineering projects, namely if they can be propagate by cutting. There is not a large number of these species for the Mediterranean region.
Ruta chalepensis L. is a species of Portuguese flora, growing in calcareous soils. Some information is available in gardening literature, about cuttings' rooting of the plants of genus Ruta. In this study is tested that characteristic.

From some individuals of R. chalepensis in the Tapada da Ajuda, Lisbon, were obtained 200 cuttings, in length between 10 and 20 cm. The cuttings were placed in pots 6x6x18 cm filled with different soils: peat mixed with vermiculite, clay, limestone and limestone mixed with clay. The planting was implemented in March 2014, an earlier period than recommended, which was August. The containers were placed with different exposure and watered regularly, ensuring that water scarcity did not become a limiting factor for the test.

The species has a good rooting capacity even in a period different from the usual one.

The results obtained demonstrate that the Ruta chalepensis L. is a pioneer species that can be suitable for the recovery of quarries using Soil Bioengineering techniques.

Fig. 13 Ruta chalepensis Sibthrop J., Smith J.E., Flora Graeca, vol.4 (1823)

Ruta chalepensis L. belongs to the family Rutaceae, dicotyledonous angiosperm plants of the subclass Rosidae. characteristic of the Mediterranean scrubland, is widely distributed in the Atlantic and Mediterranean southern coasts (Figure 1).
Bibliographic research have revealed information regarding the use of this species only for pharmaceutical and medical purposes or gardening. But it was found no data on scientific studies or morphometric research. Selected individuals have been taken from the Higher Institute of Agronomy, Technical University of Lisbon, located in Tapada da Ajuda (Figure 2), in particular in the center of Applied Ecology "Prof. Baeta Neves" (CEABN) (Figure 3) in which the cutting propagation have been tested

Fig.1 Distribution range of the species

Fig. 2 Territorial (ISA)

Fig.3 The Area of Withdrawal of the plants

200 cuttings have been taken from some individuals. The cuttings had a length between 10 and 20 cm and were taken both from the apical part of the plant, more herbaceous, and from the plant's base, more woody. The cuttings were placed in containers 6x6x18 filled with different type of soil: peat moss mixed with vermiculite, clay, limestone and limestone mixed with clay.
No substances stimulating the cuttings growth (hormones, nutrients, etc.) was added to the soil taken in the Centre of Applied Ecology . The growth has been monitored periodically and the containers placed with different solar exposure, were watered every two days, in order to prevent the water to hinder the growth.
Four months after planting, the plants were extracted to perform the roots morphometric analysis. Manuals Measurements were made on the length size of each plant: total length; aerial root length; root length ; diameter at the top.
Taking into account the number of live plants, of plants live without roots and death plans, it has been possible to calculate the rooting cuttings percentage. The roots, cleaned and cut were scanned and analyzed using the Whinrhizo software.

Fig.4 Preparing to install cuttings

Fig. 5 Cuttings landfill

Fig.6 Monitoring cuttings growth

Fig. 7 Ruta chalepensis cuttings

Fig. 8 Cuttings extraction

Fig. 9 Identifying live plants

Fig.10 Measuring root system

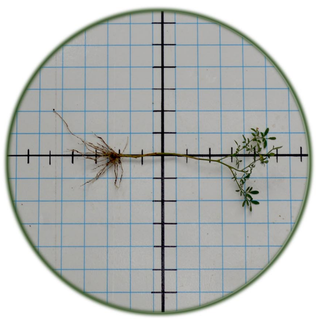


Fig. 11 Measuring root system

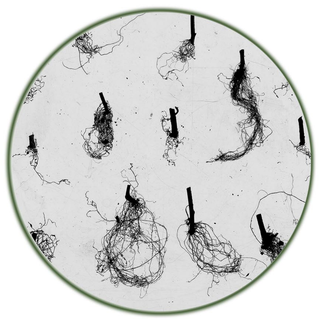
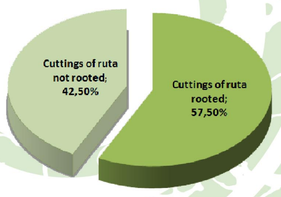
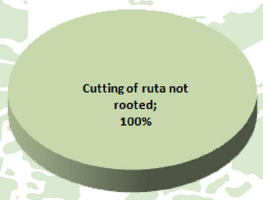


Fig. 12 Scanning images of winrhizo software

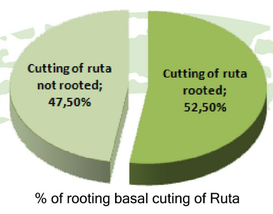
The data of rooting cuttings showed different results. Only in the container with soil limestone cuttings show a rooting percentage of 0%. It is assumed that this result is due to air presence between the stones, and the inability to retain water, both limiting factors which led to the lack of grounding. In all other cases, the rooting percentages ranging from 42.50% to 77.50%. The most interesting result is the 50% rooting in stone mixed with clay soil. This result shows that the plant is potentially suitable as a pioneer for the recovery of quarries using Soil Bioengineering techniques.



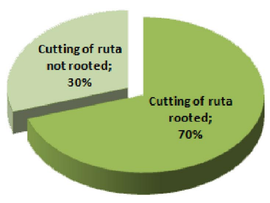
% of rooting apical cutting of Ruta chalepensis L. in clay soil.



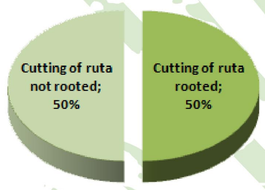
% of rooting cuting of Ruta chalepensis in rocky soil



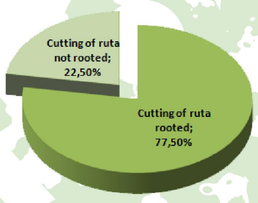
% of rooting basal cuting of Ruta chalepensis in calcareous soil



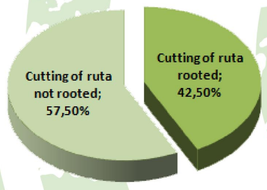
% of rooting apical cutting of Ruta chalepensis in pebbly soil



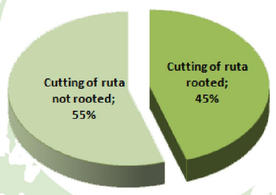
% of rooting cutting of Ruta chalepensis in earthy and stony soil



% of rooting medium cutting of Ruta chalepensis in clay soil



% of rooting basal cutting of Ruta chalepensis in clay soil and sun exposure



% of rooting basal cutting of Ruta chalepensis in clay soil

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