# RESEARCH ON THE IMPROVMENT OF PROPAGATION TECHNOLOGY IN *MAHONIA AQUIFOLIUM*

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***Abstract***

*Mahonia aquifolium (Oregon grape) is one the few broad leaved shrubs with persistent leaves encountered in cultivated greeneries from Romania. The species belongs to Berberidaceae family and is native to North America. The name of the genus celebrates the American plant grower Mahon M. Bernard. Despite the fact that it is a valuable plant, it is encountered in few places in Romania due to the scarcity of propagation material. This situation inspired the present study concerning the rooting process in Mahonia aquifolium cuttings in three different periods of the vegetation period, using two different cultivation substrates. The best results were obtained for cuttings cultivated in July, in sand substrate with grain size of 1/2mm in diameter.*

**Key words**: *Mahonia aquifolium*, cuttings, sand, peat.

## INTRODUCTION

*Mahonia aquifolium* (Oregon grape) is a 1.5 m tall woody plant which is forming dense shrubs with persistent, ovate, composed, leathery leaves, also sessile, serrated, of glossy deep green color with 5-9 leaflets reaching 3-7 in length (Zaharia, 2003).

During the winter, the leaves become purple reddish (Iliescu, 1998). The flowers are yellow, are grouped in dense clusters at the top of the shoots and disperse an unpleasant odor (Cantet, 1999). The shrub blooms in April - May (Mottet, 2005). Fruits are berries and reach 4-6 mm in diameter at the maturity, of black color with bluish tinge and abundantly pruinose (Şofletea and Curtu, 2007).The shrubs as particularly beautiful ornamentals are employed for screening in green fences while shoots are used for floral greenery (Vlad, 2010).

It grows well on aerated soils, well drained internally and with reaction (pH) in the range of 6.2-6.8 (Lancaster, 1994). Oregon grape withstands well drought, coldness, smog and other gaseous pollutants (Hessman, 1992.

In Romania it is rarely encountered due to the reduced propagation efficiency (Vlad, 2010).

## MATERIAL AND METHOD

The aim of the present study was to establish the most favorable rooting period for this species, accordingly, shoots of one year old were planted for rooting in April, July and October using two different substrates containing peat and sand. The rooting of cuttings is generally influenced by several factors:

- The presence of reserve and growth stimulating substances in the tissues of the cuttings.

– The minimization of water loss during the rooting period.
– Providing the optimal conditions for the rooting process.

There were employed a number of 120 cuttings for rooting per experimental variant. The experiments took place during the period 2009-2011 in a greenhouse situated in Sîntandrei, a locality near city of Oradea, Bihor County, North-Western Romania.

The work hypothesis consisted in performing the cuttings in different periods, using a cheap substrate and easily to process, under favorable microclimate, uniform and efficient shading during the summer conditions which conducted to the establishment of the best rooting period, best yield performance and economic efficiency.

The rooting of the cuttings was performed in the following substrates: river sand, a mixture of sand and peat in proportion of 1;1, field soil with sand, sand and perlite or vermiculite (Brookens, 2004).

In Romania there were made several recommendations concerning rooting substrates for cuttings; a mixed substrate of peat and perlite (2;1) (Zaharia, 1992) or beech sawdust with sand (1;1) (Vlad, 2012).

In Germany, good results in the rooting of the cuttings were obtained on the substrate consisting of river sand with grains of 1-2 mm diameter in proportion of 80% and pine needles used in proportion of 20% (Braun, 2004).

After complete rooting of the cuttings, those were placed in 12 cm diameter containers using field soil 40%, garden soil 30%, peat 20% and sand 10%.

The observations and measurements concerning the proportion of rooted cuttings, numbers and dimensions of roots were performed in different experimental variants.

## RESULTS AND DISCUSSIONS

The proportion of rooted cuttings compared to all planted cuttings was different according to experimental variants however; the numbers clustered on applied factors (table 1).

*Table 1*

Rooting of *Mahonia aquifolium* cuttings, experimental results (average values), Sîntandrei 2009-2011

| No | Variants | | Number of rooted cuttings | | ±D | The significance of the difference |
|---|---|---|---|---|---|---|
| | Period for planting | Rooting substrate | Absolute (individuals) | Relative % | | |
| 1 | Planting of cuttings in April | sand | 88 | 110 | 8 | * |
| 2 | Planting of cuttings in April (control) | peat | 80 | 100 | - | - |
| 3 | Planting of cuttings in July | sand | 108 | 135 | 28 | *** |
| 4 | Planting of cuttings in July | peat | 102 | 128 | 22 | ** |
| 5 | Planting of cuttings in October | sand | 96 | 120 | 16 | ** |
| 6 | Planting of cuttings in October | peat | 90 | 113 | 10 | * |

LSD 5% - 25.5
LSD 1% - 14.2
LSD 0.1% - 7.9

In variant 1 (cuttings planted in April, in sand substrate) the rooting proportion exceeded with 10% the number of rooted cuttings obtained in the control plot (variant 2 in

table 1). In variant 4 (cuttings planted in July, in peat substrate) the proportion exceeded the control with 28%. In variant 3 (cuttings planted in July, in sand substrate) the proportion exceeded the control with 35%. In variant 6 (cuttings planted in October, in peat substrate) the proportion exceeded the control with 13&. In variant 5 (cuttings planted in October, in sand substrate) the proportion exceeded the control with 20%.

Statistical differences were significant in variant 6 (cuttings planted in October, in peat substrate) and in variant 1 (cuttings planted in April, in sand substrate), distinctly significant in variant 5 (cuttings planted in October, in sand substrate) and in variant 4 (cuttings planted in July, in peat substrate) and highly significant in variant 3 (cuttings planted in July, in sand substrate).

The quality of rooting can be assessed considering the average root number per cutting (table 2). Results show that between the control and other variants there are significant differences ranging from 9.7 and 14.9 roots per cutting. Expressed in proportions, these differences are equivalent to an excess of 6% in variant 1, 26% in variant 6, 29% in variant 5, 45% in variant 4 and 54% in variant 3 compared to control variant 2.

Statistical differences are highly significant in variant 3 (cuttings planted in July, in sand substrate), distinctly significant in variant 4 (cuttings planted in July, in peat substrate) and significant in variant 5 (cuttings planted in October, in sand substrate) and variant 6 (cuttings planted in October, in peat substrate).

*Table 2*

The average number of roots per cutting in *Mahonia aquifolium* cuttings, Sîntandrei 2009-2011

| No | Variants | | Number of roots per cutting | | ±D | The significance of the difference |
|---|---|---|---|---|---|---|
| | Period for planting | Rooting substrate | Absolute (individuals) | Relative % | | |
| 1 | Planting of cuttings in April | sand | 10.3 | 106 | 0.6 | - |
| 2 | Planting of cuttings in April (control) | peat | 9.7 | 100 | - | - |
| 3 | Planting of cuttings in July | sand | 14.9 | 154 | 5.2 | *** |
| 4 | Planting of cuttings in July | peat | 14.1 | 145 | 4.4 | ** |
| 5 | Planting of cuttings in October | sand | 12.5 | 129 | 2.8 | * |
| 6 | Planting of cuttings in October | peat | 12.2 | 126 | 2.5 | * |

LSD 5% - 1.75; LSD 1% - 2.8 ; LSD 0.1% - 4.52

**CONCLUSIONS**

- The aim of the present study was to establish the most favorable rooting period for this species, accordingly, shoots of one year old were planted for rooting in April, July and October using two different substrates containing peat and sand.
- Statistical differences were significant in variant 6 (cuttings planted in October, in peat substrate) and in variant 1 (cuttings planted in April, in sand substrate), distinctly significant in variant 5 (cuttings planted in October, in sand substrate)

and in variant 4 (cuttings planted in July, in peat substrate) and highly significant in variant 3 (cuttings planted in July, in sand substrate).

- Oregon grape is a valuable ornamental plant, with a restricted distribution in Romania due to the scarcity of planting material and low multiplication efficiency.
- The duration of rooting process of the cuttings stretches over 140-150 days for cuttings planted in April, 100-110 days for cuttings planted in July and 135-130 days for cuttings planted in October.
- The best experimental variant in terms of rooted cuttings proportion and number of roots per cutting was variant 3 (cuttings planted in July, in sand substrate).
- The increase of multiplication rate in Oregon grape can be stimulated by using an appropriate substrate and good timing.
- The results obtained in the greenhouse experiment at Sîntandrei (near Oradea, Bihor County) sustain the extension of *Mahonia aquifolium* cultivation in Romania.

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