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| Teorētiskais pamatojums kaļķa un dolomīta aizstāšanai ar koksnes pelniem un lopu mēslu aizvietošanai ar tirgū mazāk pieprasītām kūdras frakcijām  THEORETICAL BASIS FOR THE SUBSTITUTION OF LIME AND DOLOMITE WITH WOOD ASH AND FOR THE SUBSTITUTION OF ANIMAL MANURE WITH LESS MARKETED PEAT FRACTIONS |
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| **3.1.** **Development of the theoretical framework for the usage of wood ash as a substitute for lime and peat coarse fraction as an alternative to manure**  **3.1.Teorētiskā pamatojuma izstrāde kaļķa un dolomīta aizstāšanai ar koksnes pelniem un lopu mēslu aizvietošanai ar tirgū mazāk pieprasītām kūdras frakcijām.** |



**Materiāls angļu valodā sagatavots apzinot tirgu pieejamo substrātu un augsnes ielabošanas līdzekļu sastāvu,īstenojot pētījumu: Inovatīvu Baltā vītola-daudzgadīgo zālaugu agromežsaimniecības sistēmu ierīkošana ar koksnes pelnu un  
mazāk pieprasīto kūdras frakciju maisījumiem ielabotās marginālās minerālaugsnēs**

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Authors

Ieva Ivbule – rewiew,

Viktorija Vendiņa - review

Dagnija Lazdiņa – technical corrections of the text.

Summary

The substrates available on the market, intended for the cultivation of tree and shrub seedlings in horticulture and forest lands, were examined and compared.

Many companies produce peat substrates, but the available information about the composition of peat substrates is scarce, as it is part of a trade secret.

To create an alternative substrate for them when choosing wood ash as a source of minerals, this report compares only those peat substrates whose manufacturer has indicated the size of the peat fraction,

composition, pH, NPK content in the substrate, and trace elements, in order to create a full-fledged replacement mixture with wood ash.

Substrates intended for the cultivation of forest seedlings have a small content of additional added microelements and minerals, therefore a decision was made to create 6 pilot series varying the admixture of wood ash from 20-30%, mixing them with 5-10; 7-20; 20-40 mm peat fractions and growing White willow willow cuttings in them, selected in the vicinity of Jelgava and in Kalsnava MPS Willow mother garden.

It was decided to make 6 pilot series with 10, 20, 30% wood ash and coarse peat fraction "bales" or fine fraction 0-7mm for testing soil improvement agents. The correction agent is tested by incorporating it into the mineral and plastic vegetation containers (building tubs) collected at the place of the future experimental planting, while growing the seedlings of the willow cuttings collected in the spring.

Introduction

The substrates available on the market, intended for the cultivation of tree and other seedlings in horticulture and forest lands, were examined and compared. Many companies produce peat substrates, but the available information about the composition of peat substrates is part of a commercial secret.

In order to create an alternative substrate to already in market available for hobby level gardening - choosing wood ash as a source of minerals is possible.

This review contains information about only those peat substrates whose manufacturer has shown the size, composition, pH, NPK content of the peat fraction in the substrate, microelements, in order to be able to create a full-fledged replacement mixture with wood ash.

Substrates intended for the cultivation of forest seedlings have a small content of additionally added microelements and minerals, so a decision was made to create 6 pilot series by varying the admixture of wood ash from 20-30%, mixing them with 5-10; 7-20; 20-40 mm peat fractions and growing White willow cuttings in them, selected in the region of Jelgava and in Kalsnava Forest research station Willow mother garden. garden.

It was decided to make 6 pilot series with 10, 20, 30% wood ash and "bales" of coarse peat fraction or fine fraction 0-7mm for testing soil improvement agents. The correction agent is tested by incorporating it into the mineral soil and putted in plastic vegetation containers. Mineral soil collected at the place of the future experimental planting.

Methods

Peat producers who have access to information on the composition of substrates intended for shrubs and trees:

1. <https://peatman.eu/tree-shrub-nursery/>

* EXTRA COARSE PEAT PTS 5.5 Extra coarse 20-40 structure peat, NPK fertilizers not included, additives- trace elements and wetting agent are included.
* SUBSTRATE PTS 5.2+CLAY Extra coarse 20-40 structure peat with: clay, NPK fertilizers (3 kg/m3 slow-release (6-9 month)), trace elements and wetting agent.

2.<https://www.compaqpeat.lv/en/growfit>

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3. <http://laflora.lv/lv/produkti/kudras-substr%C4%81ti-un-produkti/KKS-M2/8>

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|  | **Additives**   |  |  | | --- | --- | | Cut peat moss ( sieved) | 30% | | Milling peat (sieved) | 70% | | Moisture | max 60% | | pH-value (KCl) | 4.5 -5.3 | | EC ms/cm | 0.25 | | Calcium, Ca % | 1.15 | | Magnesium, Mg % | 0.10 | | Clay | - | | Fertilizer (PG Mix 15-10-20)(kg/m3) | 0.8 | | Dolomite flour kg/m3 | 0.6 | | Limestone flour kg/m3 | 4 | | Wetting agent l/m3 | 0.3 | | Osmocote | - | | Trace element | - | | Structure | 0-7 mm | |

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4. <https://klasmann-deilmann.com/wp-content/uploads/8982_KD_Aktualisierung_Easy_Growing_EN.pdf>

5. <https://hortimedpeat.com/products/substrates>

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| |  |  | | --- | --- | | Fraction size, mm | 10- 40 | | EC, ms/cm | 0.5-0.9 | | Wetting agent, l/m3 | 1 | | NPK 14-16-18, kg/m3 | 1.2 | | pH level | 5.5-6.5 | | Microelements  (RADIGEN FLORASPUR) g/m3 | 50 | | Slow release fertilizer (LDZ 39 N (HORTAZON, AZOLON)), g/m3 | 250 | | |  |  | | --- | --- | | Fraction size, mm | 10- 40 | | EC, ms/cm | 0.5-0.9 | | Wetting agent, l/m3 | 1 | | NPK 14-16-18, kg/m3 | 1.4 | | pH level | 5.5-6.5 | | Microelements  (RADIGEN FLORASPUR) g/m3 | 50 | | Slow release fertilizer (LDZ 39 N (HORTAZON, AZOLON)), g/m3 | 250 | |

6. <https://kudras.com/en/products/substrates/item/104-21-text-en>

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|  |  | **KUDRAS KS3**  **Medium-Coarse Structure (0-20 mm)** | **KUDRAS KS4**  **Basic Structure (0-40 mm)** | **KUDRAS KS5**  **Coarse Structure (5-20 mm)** | **KUDRAS KS6**  **Coarse-Fibrous Structure (20-40 mm)** |
| Description | **Peat type** | 100 % White peat | 100 % White peat | 100 % White peat | 100 % White peat |
| **Screen Setting, mm** | 0-20 | 0-40 | 5-20 | 20-40 |
| **Structure** | Medium-Coarse | Basic | Corse | Corse-Fibrous |
| **pH- value (CaCl2)** | 5.1-6.1 | 5.1-6.1 | 5.1-6.1 | 5.1-6.1 |
| **pH- value (H2O)** | 5.6-6.6 | 5.6-6.6 | 5.6-6.6 | 5.6-6.6 |
|  |  |  |  |  |  |
| Additives | **PG Mix 14-16-18 + micro, kg/m3** | 1.2 | 1.2 | 1.2 | 1.2 |
| **Slow-release 38 N, g/m3** | 250 | 250 | 250 | 250 |
| **Radigen (micronutrient depo fertilizer), g/m3** | 50 | 50 | 50 | 50 |
| **Wetting Agent, l/m3** | 1 | 1 | 1 | 1 |

Conclusions

Peat consists of 95% organic materials, has a high water-holding capacity. Porous peat supplies oxygen to the roots and provides good drainage. Comparing peat substrates, from different substrate manufacturers, for trees and shrubs, it can be concluded that different size fractions of light milling peat and light cut peat are used, with different fraction size from 0-7 mm; 10-25mm and fibers 20-40mm, as well as coarse fiber structures.

There are manufacturers of peat substrates that add clay or Bara clay, which makes the substrate more hydrophilic and provides better cation and anion exchange capacity. NPK fertilizer mostly added to the substrates, without indicating which specific type of NPK fertilizer is used, but the amount applied is on average 1 kg/m3, if a more specific type of fertilizer is mentioned, then PG MIX 15-10-20 0.8 kg/m3 or PG MIX 14-16-18 1.2 kg/m3 are used. In the substrate market are available substrates, where NPK fertilizers are supplemented with slow-acting fertilizers, which ensure a constant supply of nutrients over a longer period of time, up to 4 months.

Additional trace elements (Radigen, LDZ) containing magnesium, boron, manganese, iron, copper, molybdenum, zinc have been added to most commercially available substrates. However, there are peat substrate manufacturers who do not add trace elements.

The study of the composition of commercially available peat substrates provides knowledge about the size of peat fractions and the amount of NPK elements used to create a substrate for trees and shrubs, so that a new mixture based on wood ash can be prepared.

As a result, a scientific publication has been written about the types of fertilizers that are used for fertilizing willows in order to increase the yield: Vendina V., Zusevica A., Lazdina, D., REVIEW OF DIFFERENT TYPES OF FERTILIZERS FOR WILLOW PLANTATIONS (2023) Engineering for Rural Development, 22, pp. 849 – 856 DOI: 10.22616/ERDev.2023.22.TF165