

3.2. Augsnes ielabošanas līdzekļa maisījuma izgatavošana laboratorijas apstākļos, tā ķīmiskā un mehāniskā sastāva noteikšana, substrātu izgatavošana

3.2. theoretical framework for the usage of wood ash as a substitute for lime and peat coarse fraction as an alternative to manure

Salaspils 2023



**Materiāls angļu valodā sagatavots analizējot LVMI Silava 2011-2023.gadā izgatavotos koksnes pelnu un kūdras maisījumus, 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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Substrates and soil amendments are made in the Climate house located in Salaspils. The substrates were mixed according to the weight ratio, taking different types of peat fractions and adding wood ash, a soil amendment was made based on the dose per hectare.

**Substrates**

Different substrates were created in the climate house for two consecutive years (tab. 1) for their creation, surpluses from the peat production process were used - peat fractions of different sizes (5-10 mm; 7-20 mm; 20-24 mm) mixed with wood ash to achieve a substrate rich in macro and microelements. The substrate was mixed with a concrete mixing machine. The substrates of 2021 year are made from the surpluses of peat fractions of different sizes, mixed with 20% and 30% wood ash. After creating the substrates, they were filled in seedling cassettes, and the most productive and durable clones of white willow ('0214W', '0218B', 'LVX1', 'Platonis') were planted into them and grown in the Climate house. To create the 2022 year substrates, commercially available non-enriched peat was used, characterized by a pH of 2.9-3.5 and a fraction size of 0-35 mm. Commercially available unenriched peat was mixed with wood ash to create a substrate richer in macro and micronutrients. For the substrates created in 2022, ash admixture was also made in two variants, where one variant is similar to that of 2021 (30% wood ash additive) and the other is much larger (60% wood ash additive). For newly created substrates, after their mixing, chemical analyses have been taken to determine the chemical composition of the newly created mixture and its properties.

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| **Year** | **Substrates** | **Planted white willow clones** |
| 2021 year | 5-10 mm peat fraction + 20% wood ash | 0214W, 0218B, LVX1, Platonis |
| 5-10 mm peat fraction + 30% wood ash | 0214W, 0218B, LVX1, Platonis |
| 7-20 mm peat fraction + 20% wood ash | 0214W, 0218B, LVX1, Platonis |
| 7-20 mm peat fraction + 30% wood ash | 0214W, 0218B, LVX1, Platonis |
| 20-40 mm peat fraction + 20% wood ash | 0214W, 0218B, LVX1, Platonis |
| 20-40 mm peat fraction + 30% wood ash | 0214W, 0218B, LVX1, Platonis |
| Control ( agricultural soil) | 0214W, 0218B, LVX1, Platonis |
| 2022 year | Commercially available unenriched peat + 30% wood ash | Alba 3, 0214W, Alba 4, 0208N, 0218B |
| Commercially available unenriched peat + 60% wood ash | Alba 3, 0214W, Alba 4, 0208N, 0218B |
| Control (commercially available unenriched peat) | Alba 3, 0214W, Alba 4, 0208N, 0218B |

**Soil amendment**

To create the 2021 year mixture to improve soil conditions in agricultural land, coarse peat fraction and fine (0-7mm) peat fraction were used. Each fraction type was mixed with three different wood ash additives (10%, 20%, 30%). The doses for the 2022 year soil amendments were the same as for the 2022 developed substrates. The doses applied to the hectare were P4 + K6 (4300 kg ha-1 ash + 6000 kg ha-1 peat), referred to as a 60% admixture, and P4 + K12 (4300 kg ha-1 ash + 12000 kg ha-1 peat), referred to as a 30% admixture. The applied amount of peat and wood ash was recalculated per the area of the planting tub used (1 planting tub area = 0.25 m2). Thus, soil improvements were made with four types of peat fractions (fine peat fraction (0-7 mm), coarse peat (RP), milled peat (MP), and commercially available unenriched peat). Primarily, the tubs were filled with agricultural soil (44 kg), obtained from the Jankalsanava agroforestry plantation and then on the surface applied created peat+ wood ash mixture. This created mixture was thoroughly mixed to a depth of 15 cm into the soil, such way improving the chemical composition of the soil. The control group used agricultural soil in which neither peat nor ash was added.



Fine (0-7 mm) peat fraction with 30% wood ash additive

Fine (0-7 mm) peat fraction with 60% wood ash additive

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| **Year** | **Mixture** | **Planted white willow clones** |
| 2021 year | Coarse peat with 10% wood ash additive | 0205K, 0206L, 0207M, 0208N, 0214W, 0218B, 2011S, LVX1, LVX2 |
| Coarse peat with 20% wood ash additive | 0205K, 0206L, 0207M, 0208N, 0214W, 0218B, 2011S, LVX1, LVX2 |
| Coarse peat with 30% wood ash additive | 0205K, 0206L, 0207M, 0208N, 0214W, 0218B, 2011S, LVX1, LVX2 |
| Fine (0-7 mm) peat fraction with 10% wood ash additive | 0205K, 0206L, 0207M, 0208N, 0214W, 0218B, 2011S, LVX1, LVX2 |
| Fine (0-7 mm) peat fraction with 20% wood ash additive | 0205K, 0206L, 0207M, 0208N, 0214W, 0218B, 2011S, LVX1, LVX2 |
| Fine (0-7 mm) peat fraction with 30% wood ash additive | 0205K, 0206L, 0207M, 0208N, 0214W, 0218B, 2011S, LVX1, LVX2 |
| Control | 0205K, 0206L, 0207M, 0208N, 0214W, 0218B, 2011S, LVX1, LVX2 |
| 2022 year | Coarse peat with 30% wood ash additive | 0205K, 0207M, 0208N, 0212T, 0214W, 0218B, 0225K, Alba5, LVX2 |
| Coarse peat with 60% wood ash additive | 0205K, 0207M, 0208N, 0212T, 0214W, 0218B, 0225K, Alba5, LVX2 |
| Fine (0-7mm) peat fraction with 30% wood ash additive | 0205K, 0207M, 0208N, 0212T, 0214W, 0218B, 0225K, Alba5, LVX2 |
| Fine (0-7mm) peat fraction with 60% wood ash additive | 0205K, 0207M, 0208N, 0212T, 0214W, 0218B, 0225K, Alba5, LVX2 |
| Milled peat with 30% wood ash additive | 0205K, 0207M, 0208N, 0212T, 0214W, 0218B, 0225K, Alba5, LVX2 |
| Milled peat with 60% wood ash additive | 0205K, 0207M, 0208N, 0212T, 0214W, 0218B, 0225K, Alba5, LVX2 |
| Commercially available unenriched peat with 30% wood ash additive | 0205K, 0207M, 0208N, 0212T, 0214W, 0218B, 0225K, Alba5, LVX2 |
| Commercially available unenriched peat with 30% wood ash additive | 0205K, 0207M, 0208N, 0212T, 0214W, 0218B, 0225K, Alba5, LVX2 |
| Control | 0205K, 0207M, 0208N, 0212T, 0214W, 0218B, 0225K, Alba5, LVX2 |



