PRODUCTIVITY OF *SALIX* SPP. CLONES GROWING IN A FIELD TRIAL IN LATVIA

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INTRODUCTION

Fast-growing tree species such as willows cultivate to produce high biomass yields for energy purposes in a short period of time. Willow plantations have good abilities for this purpose: easy established from un-rooted cuttings, increases the biodiversity in the field, can be used for remediation to clean contaminated land, and have high regenerative properties after harvesting. Biomass from the willow plantation can be obtained repeatedly with a cycle of 3-4 years. An amount of biomass are depended on the soil type, nutrient content, water availability, and the suitability of the selected clone for specific weather conditions at the planting site.

OBJECTIVES

- To evaluate the biomass of different *Salix* spp. clones in the experimental field.
- To estimate the amount of planting material for the vegetative propagation obtained from different *Salix* spp. clones.

METHODOLOGY

- **Location of the experimental field.**

The experimental field was established in spring 2016 in Latvia, Kalsnava (56.68764N, 25.93907E) (Fig.1). The average annual temperature of the area is +6 °C. The average annual precipitation is 650-750 mm. The vegetation period, when the daily average temperature exceeds 5 °C, is 194 – 196 days.

Fig.1. Location of the field trial

- **Materials and methods.**

Together 13 commercial willow clones: 'Bella', 'Birgit', 'Emma', 'Erik', 'Estelle', 'Ester', 'Lisa', 'Monika', 'Olof', 'Sven', 'Visvaldis', 'Wilhelm', 'Winter' and six experimental Salix alba clones '0218B', '0206L', '0207M', '0208N', '0211S', '0214W' were tested in this study. After four growing seasons, when the willows were in the leafless state, the above-ground biomass was weighed (Fig.2). For the five most productive willow clones, above ground biomass was evaluated for each plant individually, but for the others only the mean biomass was obtained.

One year after harvesting, the height of regrown shoots was measured. These shoots could bee used for the preparation of planting material. In the measurements was not included the shoots of the height of less than 0.5 m and diameter of less than 0.5 mm. For *Salix alba* clones the amount of planting material wasn't calculated, because the experimental clones did not show good regrowth abilities.

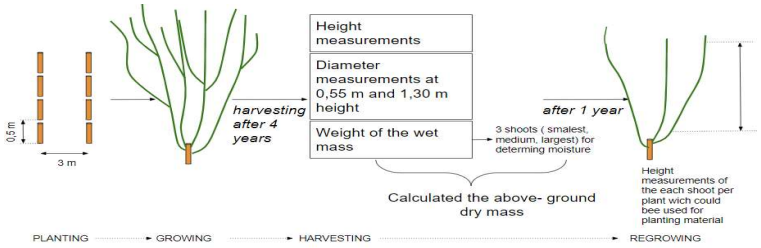

Fig.2. Methodology for evaluating biomass and potential planting material amount

RESULTS AND DISCUSSION

From willow clones 'Wilhelm', 'Birgit', 'Bella', 'Sven', 'Emma' and three *Salix alba* clones '0208N', '0214W' and '0218B' more than 1 kg of dry mass can be obtained from one plant per four years (Fig.3).

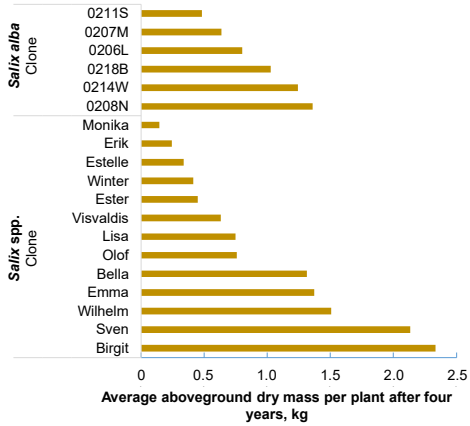

Fig.3. Average dry mass amount per plant from different *Salix* spp. clones

A high variation was observed for the five most productive willow clones depending on the obtained dry mass for each plant (Fig.4). Willow clones 'Birgit' and 'Sven' are the most productive in the experimental field.

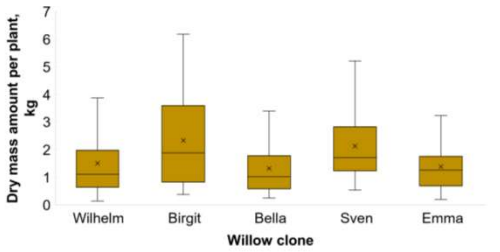

Fig.4. Dry mass amount per plant from the most productive willow clones in the experimental field

More planting material can be obtained from willow clones 'Birgit', 'Ester', 'Emma' and 'Visvaldis' (Fig.5).

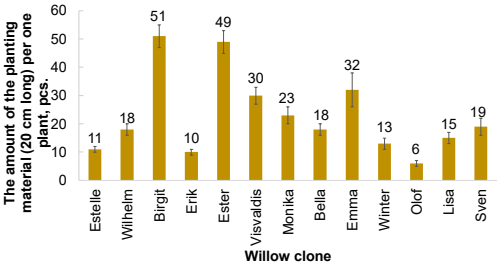

Fig.5. Amount of planting material from different willow clones

Willow clones 'Monika' and 'Visvaldis' have the lowest moisture content in biomass, it reaches only 52%, while white willow clones '0211S', '0206L', '0218B' have the highest moisture content in biomass, around 58% (Fig.6).

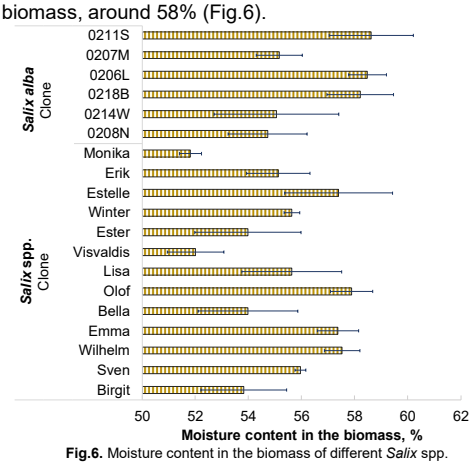

Fig.6. Moisture content in the biomass of different *Salix* spp.

The most productive willow clone in the experimental field is 'Birgit' which has the highest dry mass and can produce highest amount of planting material per plant.

CONCLUSIONS

1. Willow clones Brigit and Sven had the highest biomass from selected clones and measured dry biomass for these clones was respectively 2,3 ± 0,2 kg for 'Brigit' and 2,3 ± 0,2 kg for 'Sven'.
2. In four years, the amount of biomass obtained from the experimental white willow clones is comparable to the less productive commercial willow clones. These white willow clones are more suitable for a longer cycle with a different application purpose (firewood, timber).
3. The most vegetative planting material amount , 20 cm long cuttings, is obtained from the willow clone 'Birgit' - 51 pieces. As the next the most productive willow clones are 'Ester' - 49 pieces, 'Emma' – 32 pieces and 'Visvaldis' – 30 pieces.

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