Coppice Forests in Europe: a traditional natural resource with great potential

Small scale pellet production from poplar (Populus sp) and aspen (Populus tremula L) timber: a case study

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Introduction

- Industrial pellets is the main product in pellet market;
- Small and medium pellet consumers usually purchase pellets from domestic traders with national or regional supply chains;
- Pellets quality standards.
- Pellets mechanical durability

Introduction

- Small scale production;
- Private forest owners;
- Pellets for own use;
- Sales in local market;
- Raw material from pre-commercial thinning;
- Litter material for animals.

Aim of the study

- Compare different tree mixtures from common tree species in small scale pellet production;
- Test pellets mechanical durability;
- Test pellets water absorption.

Photos: D. Lazdina

Material and Methods

- Poplar (*Populus sp.*);
- Aspen (*Populus tremula L.*);

- Grey alder (*Alnus incana L.*);
- Birch (*Betula sp.);*
- Europena larch (*Larix decidua* Miil*.);*
- Pine (*Pinus sylvestris*);
- Lodgepole pine (*Pinus contorta*).

- Different combinations
- Different proportions

Material and Methods

- 8 different mixtures with aspen;
- 10 mixtures with poplar;
- In total 49 different tree mixtures were tested;
- Mixtures were mixed manually;
- Proportions were mixed according to wood volumes;
- Base material at least 70%;
- Tree trunks with bark;
- Bark content was not calculated

Material and Methods

- Peletizer capacity 200-250 kg/h;
- Die diameter 250 mm (flat)

- Mechanical durability according to LVS EN 15210–1:2010 standard

- Water absorption according to methodology

Results

Pinus Contorta 100%

Poplar 100%

Pine 100%

Aspen 100%

Results

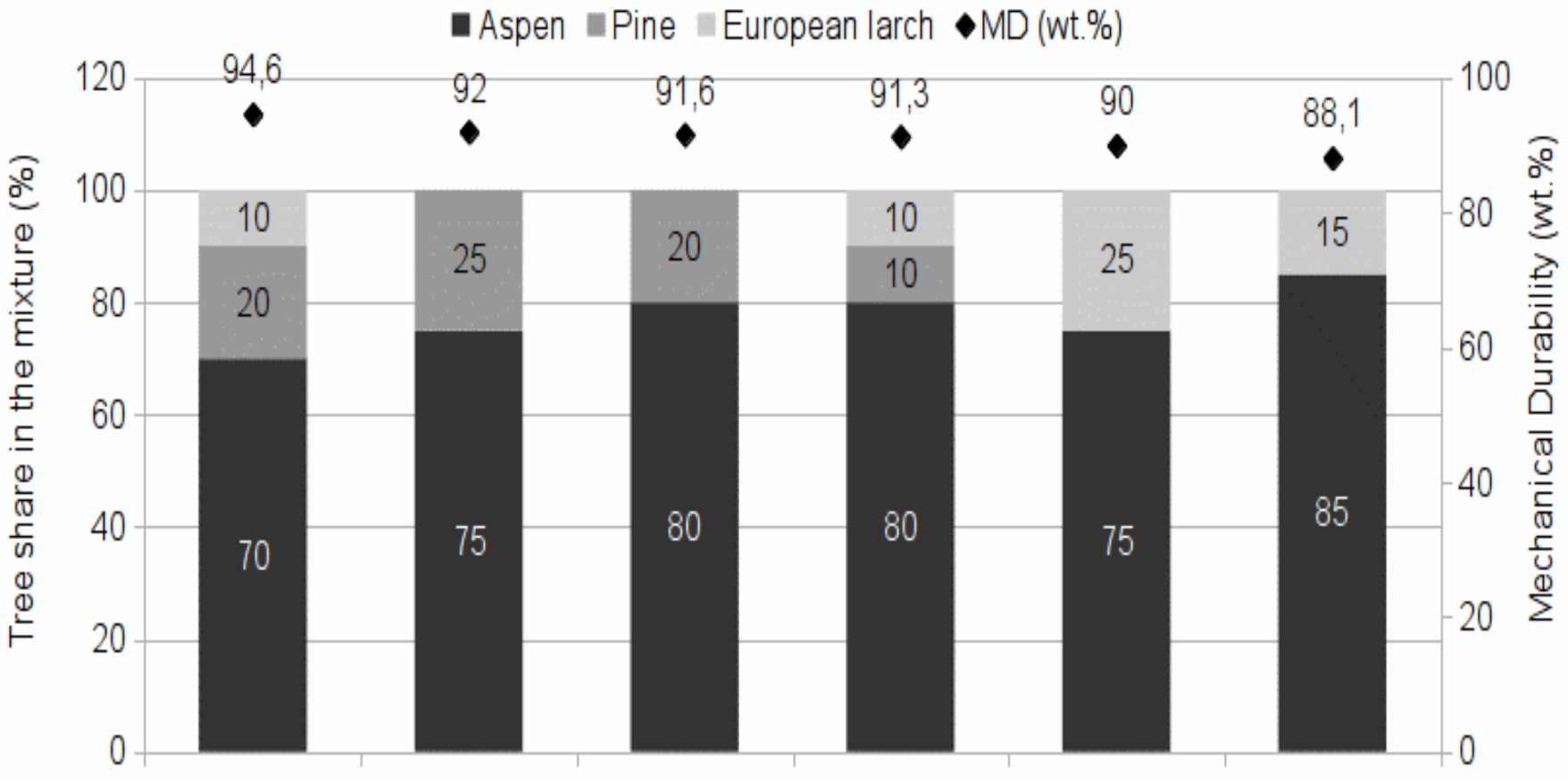
- ENplus certification scheme defines three pellet quality classes;
- One off the parameter is mechanical durability (wt.%);
- ENplusA1 class should be ≥98.0;

- **Poplar - 98.8%**
- Pinus Contorta – 96.8%
- Pine – 95.6%
- Birch - 92.3 %

- *Grey alder with pine – 98.8 % (75:25)*
- *Grey alder with lodgepole pine - 95.5% (75:25)*

Results

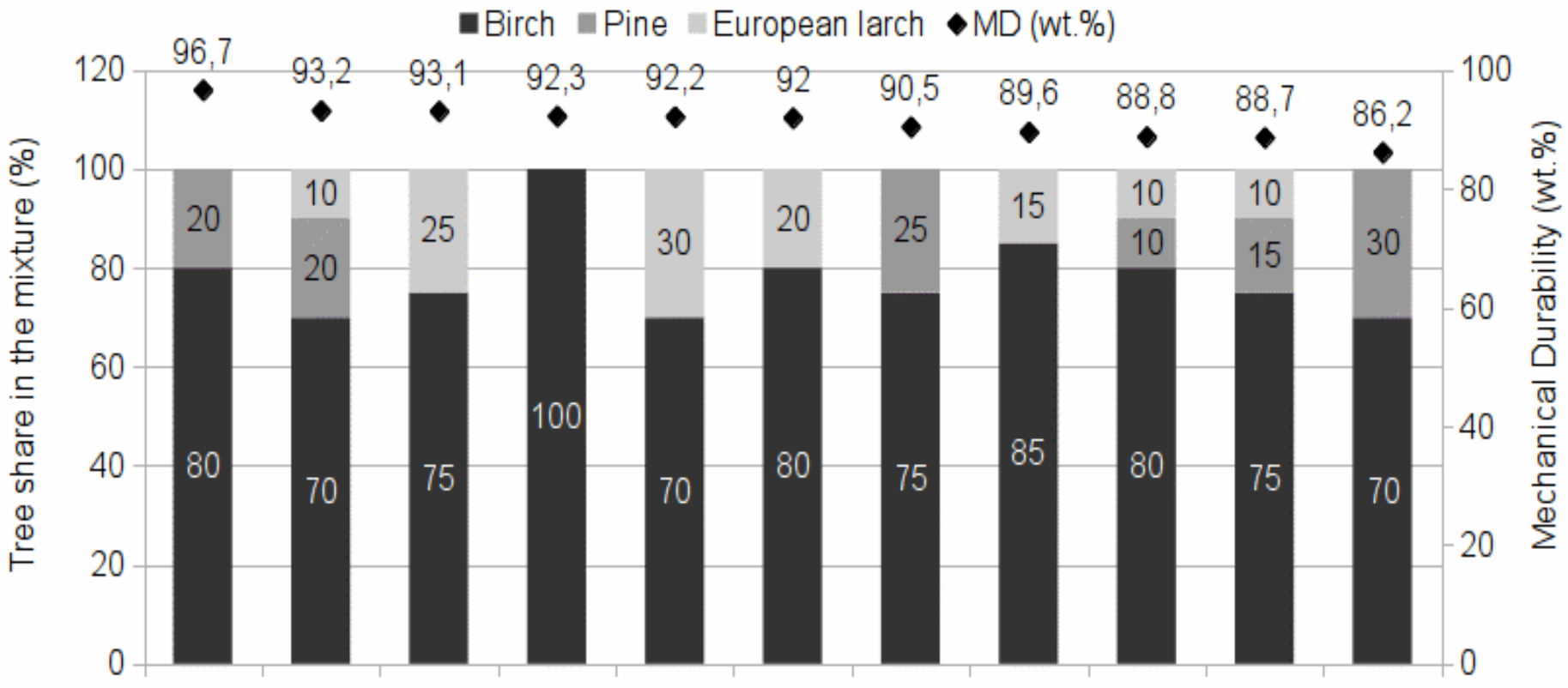
Aspen timber as base material



Better results with Pine
All mixtures are under mechanical durability standarts

Results

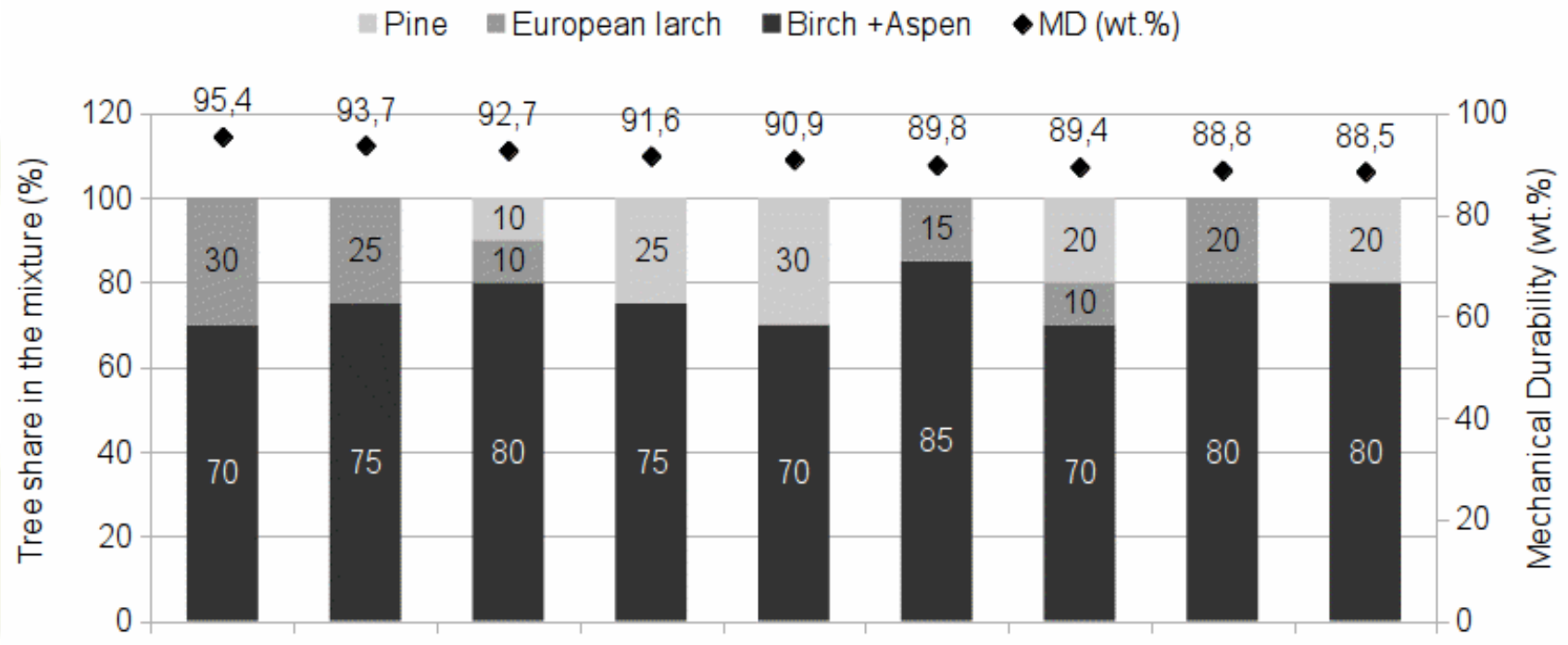
Birch timber as base material



Lower quality burning material;
Could be used as litter material

Results

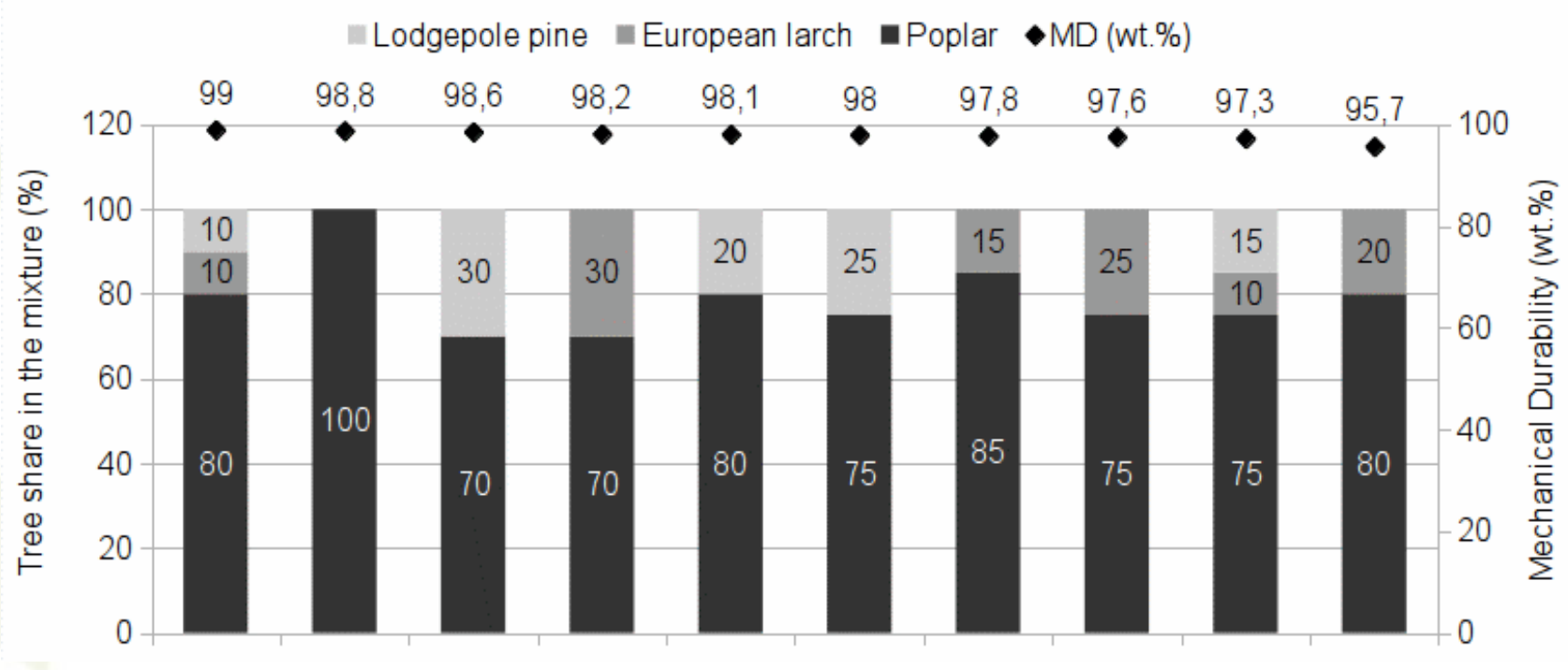
Birch and aspen in equal parts (at least 70%)



Birch and Aspen mixture as base material didn't show noticeably better results in mechanical durability than single specie use as base material.

Results

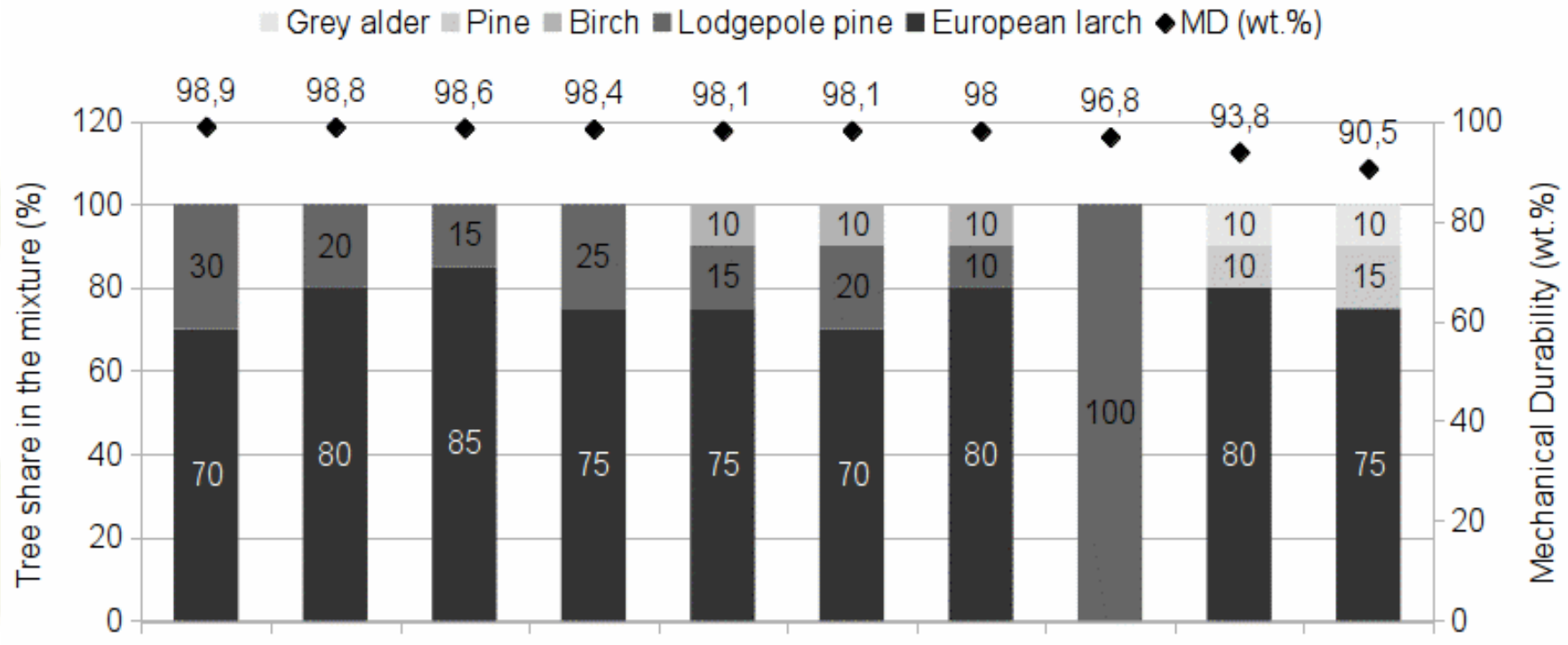
Poplar timber as base material



Best durability in mixes with Lodgepole pine and European larch;
Best pellet mechanical durability from deciduous trees shoved poplar

Results

European larch timber as base material



Better results shoved mixtures with lodgepole pine

Conclusions

- Good mechanical durability results shoved pellets where poplar and European larch was taken as base material;
- Tree species or tree specie mix is one of the factors that could influence the pellets mechanical durability and should be taken into account before starting small scale pellet production.
- Water absorption in pellets with different tree species composition does not change significantly and ranges from 0.70 to 0.73 ml g^{-1}.
- Pellets with low mechanical durability could be sold as litter material for animals

Thank You for Your attention

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