Particleboards from Reed Canary Grass

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The purpose of this study was to study...

- The use of reed canary grass as raw material for particleboards
- The use of an acrylic adhesive as binder
  - good adhesion to the external surface of the stalks
  - low penetration into the cell lumen
- The impact of a surface treatment on the properties of the board
Why…

- Monocotyledons (grass, straw) can have quite high annual biomass production
- There are agricultural residues which are partly not used (yet)
- If it is working for one of the monocotyledons, it should work for all
- Challenge: different raw material properties but the same processes
Materials and methods

• Delayed-harvest reed canary grass
• Acrylic adhesive 498 HV from Lascaux® (10 or 20 weight%)
• Lamination or paper coating as surface treatment
• Pressing setup: 100°C -140°C pressing temperature, 11mm thickness (no time limit)
Results

• The adhesive fulfilled the requirements relating adhesion to the surface and low penetration into the particles

• Non of the boards fulfilled the requirements according to EN 312, P1 or P2

• The surface treatment led to higher MoR (modulus of rupture) values
Problems / Discussion

- Nature and geometry of the grass stalks
Problems / Discussion

- Process conditions/ water evaporation

Density: 1000Kg/m$^3$  
500Kg/m$^3$
Problems / Discussion

- Rupture after gluing occurs through the cells with the big lumen of the inner surface of the grass stalks
Conclusions

• A way must be found treading the particles of monocotyledons (grass, straw) in a way that the external surface (waxy layer) and the internal surface (layer(s) of big-lumen, thin-walled cells) are treated to same extend.

  – Increase of uniformity of the particles

  – Enables using conventional adhesives such as MUF (melamine urea formaldehyde)

  – Increase the mechanical properties of the board

• Solution: eventually pre-treatment of the particles under conditions of anaerobic digestion
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