Infocard

Forest Biomass for Pellet Production

Storage and drying of raw materials for pellets

Introduction/Background

To be reliable part of fuel supply, pellet plants have to have balancing raw material available. An important issue with raw materials from forests is the moisture content of the different materials. Fresh timber can be assumed to have a moisture content of approximately 50%, pellets have a moisture content of approximately 10 to 12%. When using timber for pellets the difference of these moisture contents has to be lowered. This can be done as natural drying of the raw material or artificially during the processing of the material to pellets. Natural drying before the processing of the raw material can lower the moisture content to approximately 20–25%, the remaining 10–15% have to be lowered during the further processing of the material. The lower the moisture value before the processing the lower the costs of drying during the pelletizing process. Also the sensitivity towards mould infestation will decrease.

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Fresh whole trees from thinning operations as raw material source for pellets have a high moisture content. At the beginning of the trial (July 09) whole trees of pine had an average MC of 58.9%, birch whole trees had 43.4%.

Quality factors of pine whole tree pellets:

- → *Moisture content of raw material 13.4%*
- → *Moisture content of pellets 8.9%*
- → *Bulk density of raw material 208.1 kg/m³*
- → *Bulk density of pellets 571.7 kg/m³*
- → *Temperature 81.0°C*
- → *Pellet weight 1.93 g*
- → *Pellet length 27.51 mm*
- → *Pellet diameter 8.72 mm*
- → *Hardness (Kahl-hardness) 9.62 kg*

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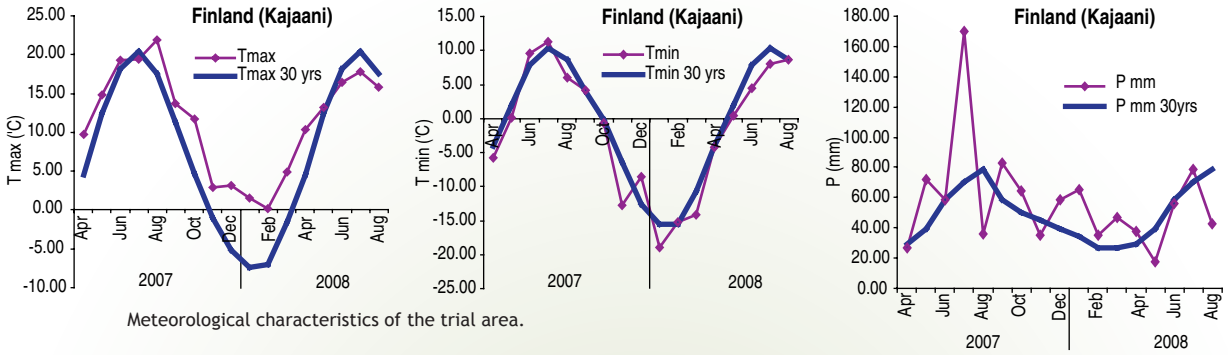

Meteorological characteristics of the trial area.

Storage of raw material

The aim of a storage is to lower the moisture content in a certain time period. An ideal storage facility is highly, aligned towards the sun and has a dry ground which is accessible throughout the year.

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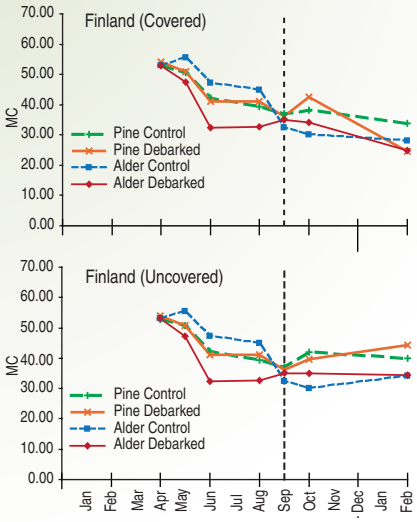
Quality for pellets

Quality requirements for the raw material in order to produce high quality pellets are high. Critical factors are purity, low bark content and low shares of unwanted elements.

Fine particle emissions from the pine pellets were on a similar level with the commercial pellets. Generally, pellets that contain bark have higher amount of ash forming elements. CO and OGC emissions from the modern small-scale pellet boilers are relatively low, when the boiler operates optimally, which was also seen in the current tests. However, differences between the tested fuels were observed. Both CO and OGC emissions were higher with the studied pellets than with commercial wood pellets. Furthermore, the NOx emissions were also higher from the studied fuels when compared to the commercial pellets which can be explained by different fuel nitrogen contents.

The pellets produces of these alternative raw materials are suitable for larger-scale, but authors do consider that the whole-tree pine has potential to become raw material for higher quality pellets.

Broad-leaved trees are very poorly used as raw material for wood pellets in Finland and using birch could greatly wide the useful raw material base. According our studies good quality pellets can be produced and cost level is near to be appropriate when using undebarked pine and birch-pine mixture as raw material.



Moisture content development of pine and alder during drying trials in Finland.

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