

Title Microwave drying of flax fibre and straw and study of the straw's use in a firelog
Author Raveendran Nair Gopu
Citation Thesis, Master of Science (Bioresource Engineering), McGill University (Canada). 86 pages. 2011
Keywords flax; drying

Abstract

Microwave-convective and conventional hot air drying of flax fibre and straw was compared at three drying temperatures (40°C, 60°C and 80°C). Microwave-convective drying ensured a 30% to 70 % reduction in drying time compared to hot air drying. Microwave-convective drying at 80°C was found to be most suitable method in terms of drying time. Drying curve fitting with different mathematical models was carried out. The colour change of the flax fibre and straw upon drying was measured and the brightness and colour change increased with an increase in drying temperature. For both drying processes, the tensile strength and modulus of elasticity of the flax fibre and straw increased with an increase in drying temperature.

The properties of firelogs mixed with different proportions of flax straw, sawdust and wax were assessed. A maximum burning temperature of 231°C was achieved by firelogs containing 60% sawdust and 40% wax binder, followed by firelogs with 70% flax straw and 30% wax (228° C). The burning rate rose with an increase in the percentage of wax, and was lowest (3.18 g min^{-1}) for firelogs containing 35% flax straw, 35% sawdust and 30% wax. Firelogs with only flax straw and wax produced the greater quantity of residues compared to sawdust-only firelogs. The maximum load applied and energy to break a firelog was greatest for 70% flax straw, 30% wax and this combination was considered as the most feasible flax-containing firelog.