

Abstract

In this study the possibility of using Canola stalk mixed with Poplar particle in the manufacture of particleboard were investigated. Percentage of mixing Canola stalk with poplar particle by a ratio of five levels (98, 93/75, 87/50, 81/25, 77%), the ratio of melamine formaldehyde resin to urea formaldehyde as bonding agents in five levels (23, 18/75, 12/50, 6/25, 2%) and Mat moisture of five levels (10, 12, 15, 18, 20%) were selected as variables. Physical and mechanical properties of boards including water absorption (WA) after 2 and 24 h, thickness swelling (TS) after 2 and 24h, modulus of rupture (MOR), modulus of elasticity (MOE) and internal bond (IB) using the EN standards were tested. Based on results of this study the increase in Canola stalks to Poplar particle to the range of 87% compared to Poplar increase, but then decrease the absorption of water and swelling of the boards. The increase in Canola stalks particles to poplar particle a relative decrease in modulus of rupture and modulus of elasticity of spruce wood boards, but the values obtained from all treatments were higher than the standard. Interaction analysis of variables showed that the increase of ratio melamine formaldehyde to urea formaldehyde and Mat moisture decreased and increased, respectively, modulus of rupture was made of boards. IB values of all treatments, lower than industry standards. In this study, according to the results of the ANOVA table and interaction between the raw material and the ratio of adhesive and Mat humidity on the mechanical properties boards, The best treated boards made with 82/65 percent canola, compared with 6/25% of MF to UF and humidity of 18% with response surface methodology (RSM) was selected as the optimum. But in the second stage of this study, the effect of particle size used in surface layers and shelling ratio on the mechanical properties of there-layered particleboard manufactured from treated canola (*Brassica napus*) particle. was studied. The shelling ratio at three levels (15:85, 25:75 and 35:65), particle size at two levels (>1.25 and <1.25 mm) and type of treatment at three levels (untreated, water-leached treated and acid-leached treated particle) were selected as independent variabls. The mechanical properties such as modulus of rupture (MOR), modulus of elasticity (MOE) and internal bonding strength (IB) of panels were tested according to the EN standard. Results showed that using the canola particle with dimension of >1.25 mm in surface layers of panels causes to increase in MOR, MOE, IB Besides, it was determined that increament of particle size in surface layers and using water – leached treatment increased the mechanical properties of panels. According to the results, with the using particle of canola stalks treated with water and dimenstion of >1.25 mm in surface layers of three-layers panels, it can be obtained the desirable MOR and MOE.

Keywords: Particle boards, Urea formaldehyde, Melamine formaldehyde, Canola stalk, Physical and mechanical properties, RSM, size particle.



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**Effect of resin melamine/urea formaldehyde ratio and moisture content of mat on
the particle board physical and mechanical properties made from Canola stalks
and Poplar**

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