

1. The long term performance of the adhesive.

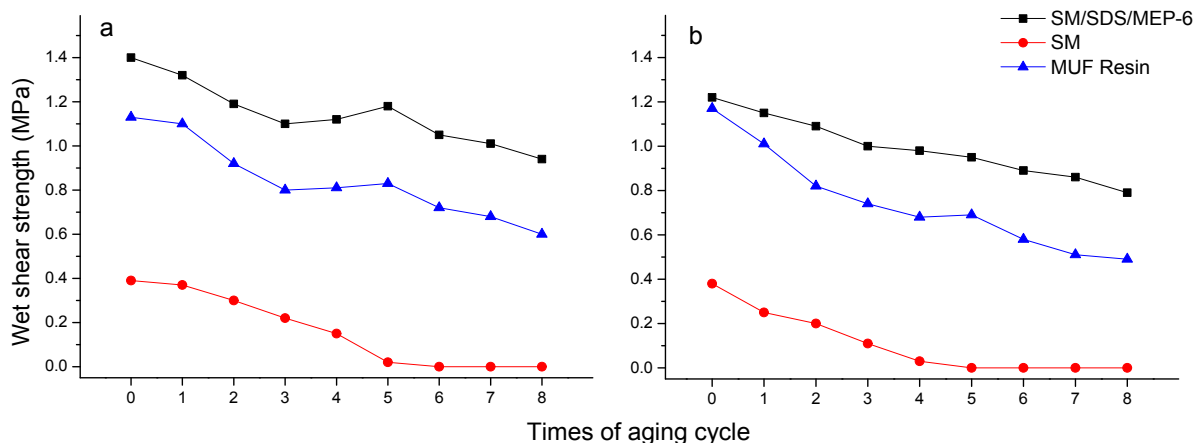


Fig. S1. The surface (a) and core layer (b) bond strength of plywood bonded with different adhesives after a wet-dry cycles treatment.

Experimental Methods

For a wet-dry cycle aging method-the specimens were soaked in water at 25 ± 2 °C for 3 h. They were then placed in a drying oven at 120 °C for several hours until a constant weight was obtained. After every treatment cycle, a wet shear strength measurement was carried on for the plywood sample and the value was recorded as a measure aging resistance.

The aging resistance properties of the plywood bonded with the modified soybean meal-based adhesive was tested and compared with a commercial MUF resin. Five-ply plywood was fabricated using SM adhesive, SM/SDS/MEP-6 adhesive, and MUF resin. The results showed that under a 25 °C wet-dry cycles of accelerated aging procedure, the plywood with SM/SDS/MEP-6 adhesive have a better aging resistance compared with the commercial MUF resin (Fig. S1), which was in accordance with the result of our previous research.¹

1 X. Zeng, J. Luo, J. Hu, J. Li, Q. Gao,* and L. Li *, *BioResources*, 2015, **11**, 4332-4341.

2. The mildew properties of the different adhesives

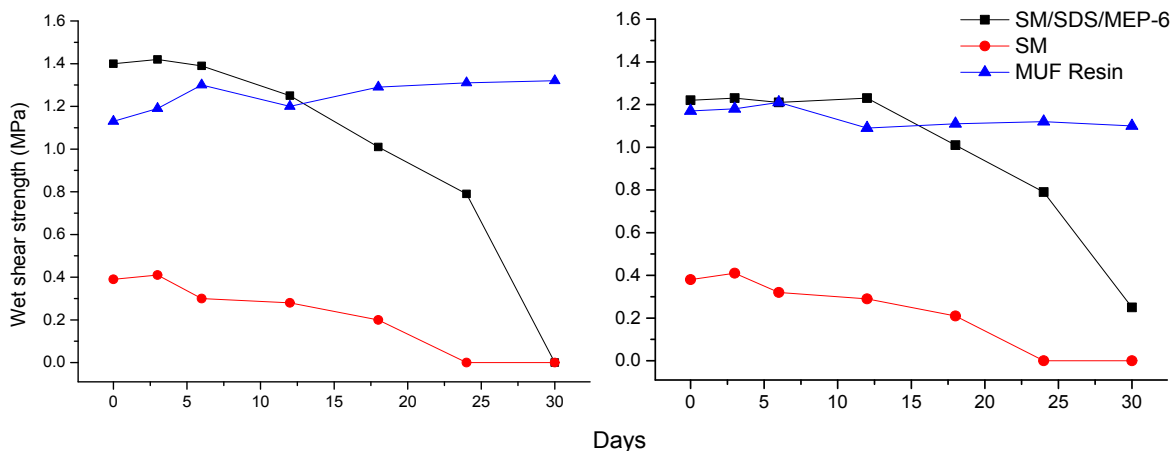


Fig. S2 The surface (a) and core layer (b) bond strength of plywood bonded with different adhesives after a mildew resistance test

Bio-based adhesives are easy to mildew and thus decrease the bond strength. The resultant plywood samples bonded with the different adhesives were put into a steel chamber with 35°C and 95% humidity to accelerate mildewing. Then these samples were carried out with a wet shear strength test. Results showed that the wet shear strength of the plywood bonded with the SM/SDS/MEP-6 adhesive decreased to 0 MPa within 30 days, while the plywood with MUF resin maintained the bond strength at 1.0 MPa (Fig. S2), which proved that the SM and modified SM adhesive had low mildew resistance. The mildew resistance property of the resultant plywood will be determined by the mildew resistance agent addition in the adhesive formulation or spraying on the surface of the plywood.