BACKGROUND (continued)

- However, in the 1930s until World War II, flours or starches from corn, rye, sorghum, wheat, and soybeans were used as extenders in wood adhesives.

- Given corn’s historical use in wood adhesives, we conducted this study to evaluate corn germ meal as a potential extender in plywood glues.

- We were previously successful in formulating a soy flour-based plywood glue applied by foam extraction that is now used commercially (Hojilla-Evangelista and Dunn, 2001, Hojilla-Evangelista, 2002).

- For corn germ meal, we selected plywood glue intended for sprayline application as the media for testing its performance as extender. This type of glue does not require foaming and is more tolerant of non-protein components of the extender (e.g. oil) than glues for foam extraction.

METHODOLOGY

Materials:

- Dried corn germ was supplied by Adventine Inc. (Pekin, IL).
- GP 5755 phenol-formaldehyde (P-F) resin (43% non-volatiles) and Southern pine veneers were provided by Georgia-Pacific Resins Inc.
- Glu-X filler was provided by The Robertson Corp. (Brownstown, IN).

Glue Preparations:

- Partially defatted dried corn germ, containing 2.1% (db) crude oil and 24.7% (db) crude protein, was ground in a coffee mill until a 40-mesh particle size was obtained. The corn germ meal was then substituted (on protein basis) for wheat flour, industry’s current protein extender, in the standard glue mix for sprayline plywood.

- We included various ingredients in the corn germ-based glue mix that were comparable to the standard adhesive.

- The compositions of the industry standard and corn germ-based sprayline glue mixes are given in Table 1.

- Replacement of wheat flour by ground corn germ was done on protein content basis.

- The amount of filler (Glu-X) in the corn germ-based glue was increased to meet viscosity requirements.

- Ingredients were added individually in the order listed, with each addition followed by 2.7 min of mixing at slow speed (setting no. 2) using the flat paddle blade of a KitchenAid® mixer (model KSM 90).

- Prepared glue mixes were allowed to stand overnight at room temperature prior to plywood processing.

- Viscosities of glue mixes were obtained before and after overnight standing and measured by a viscometer.

RESULTS

- The glues containing corn germ meal had mixing properties that were comparable to that of the standard (wheat flour-based) glue.

- The corn germ-based glue was less thick than the standard glue immediately after mixing (Table 2); however, it had a final viscosity that was almost identical to that of the standard glue after overnight standing.

- Overnight standing is conventional practice for plywood glue manufacture and generates a higher-viscosity end product.

- The mean tensile strength of the corn germ-based glue was likewise close to that obtained for the standard glue (Table 2).

- Both bond strengths are near the threshold value of 200 psi and are considered strong.

- These results indicated that corn germ meal has strong potential to be an alternative protein extender in plywood glue for sprayline coater.

REFERENCES
