

### **Effect of the relative molar mass of PEG on the properties of CORN-ZEIN films**

Films derived from biomaterials have a potential for development as a packaging material. They can extend the product shelf lives by regulating moisture and other gas transmission and provide protection by improving mechanical properties. Commercial utilization of these films as packaging materials could have a significant advantage on the environment by assisting to decrease the volume of synthetic advantage on the environment by assisting to decrease the volume of synthetic packaging entering into the waste streams. They could also improve the package recyclability by reducing the need for multi-layer materials, which are superior to monolayers but are not recyclable.

Zein is a protein derived from corn, which can be used as a film-forming agent. Pure zein form clear transparent films but these films are brittle in nature. Plasticizers such as glycerol, poly (ethylene glycol), esters of higher fatty acids etc. could be used to improve the flexibility of zein films. Glycerol and PEG 400 was found to improve the flexibility and tensile strength of the films but these failed at higher relative humidity conditions.

The effect of molar mass of plasticizer on the thermal and mechanical properties of corn-zein films has been measured. Moisture absorption and transmission was measured as a function of relative humidity. Films were cast from purified zein from a commercial source. Poly (ethylene glycol) (PEG) with molar mass 400 and 1000 g mol<sup>-1</sup> were used as plasticizers.

The thermal behaviour of the films was determined by using differential scanning calorimetry. Tensile strength of the samples was determined as function of the plasticizer content and the molar mass of the plasticizer. Moisture absorption was measured at 25°C by determining the equilibrium water content of initially dry films exposed too atmosphere with controlled humidity. Moisture transmission rate was determined at 25°C by using a permeability cell at two different relative humidities.