

201c Legume Protein and Starch as a Source for Biodegradable Plastic Materials

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The annual massive consume of plastic materials that damage the ecosystem makes imperative the development of materials with biodegradable properties. It is known that the XXI century has opened its doors to the green materials. It is our interest to study the possibilities of proteins and starch from legumes of conforming a matrix giving place to materials with plastic properties while retaining the biodegradability of the original components. At the same time, the use of legumes for industrial purposes would contribute to the improvement of the economy of agricultural areas in our country. For this reason, several beans have been studied among the species of economic significance in order to choose the more adequate for our purpose. The water-soluble fraction of proteins, with highly polar composition, was utilized; this showed a strong influence on the physical and chemical properties of the products. The starch employed as additive was isolated from the same legume sources; it was purified and characterized in terms of amylose/amylopectine ratio. The process used for the preparation of the new materials was the compression molding; the characterization included tensile properties and water absorption capability. SEM microscopy was also used for further studies. The ability to absorb water was found to be high in these materials, especially when there was important cellulose content. Different additives and/or treatments were employed in order to reduce this property, one of marked effect was the gamma irradiation of starch before its incorporation into the blend. In order to allow the possibility of these new materials to be employed in different areas such as food packaging or in pharmaceutical preparations only non-toxic additives were used. These materials can stand a sterilization process by means of ethylene oxide or gamma radiation without losing their properties. Degradability tests according to international standards based on Sturm test confirmed the biodegradability of the obtained materials. The economic advantage relays on the utilization as raw materials of damaged seeds from arable crops, habitually rejected as wastes.