

A biotechnological approach to produce new protein bioplastic

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ABSTRACT

Plastic products represent a problem for the planet: they are one of the major sources of pollution. Therefore, the scientific community is constantly looking for strategies to produce eco-friendly materials that can replace traditional plastic and this present work proposes a strategy that could partially replace them. Genetic modification of the *Phaseolus vulgaris* seed storage protein called phaseolin (PHSL) was necessary to develop this idea. The protein was engineered by inserting a cysteine into the C-terminal tail of the polypeptide chain (PHSL*) to stimulate the formation of interchain disulfide bridges. PHSL* was used to transform the plastidial genome of *Nicotiana tabacum* plants with biolistic transformation technology. Here, we demonstrated that modified phaseolin can form large molecular complexes of 20 MDa. Plasticization tests was carried out, and the bioplastic was analyzed to define some chemical-physical characteristics important at industrial level. There is a possible future application of this new biopolymer in different sectors, ranging from packaging for food industry to biomedical sector as a carrier of protein-based drugs.

Keywords: biopolymer; disulfide bridges; phaseolin; transplastomic plants.