

Abstract

Proteins are one of the most important biological macromolecules that play an important role in the metabolism of organisms. Production of recombinant proteins in large amounts and in a short time requires more efficient expression system. The use of plants as bioreactors is the ease of transformation and absence of microbial and human pathogens in plant. However, the transient gene expression due to the speed, ease and flexibility is an efficient method. To investigate the gene expression, reporter genes is used in plants. The advantage of using reporter genes is its easy study because they don't need autoradiography to detect. Studies of proteins being carried out with two-dimensional electrophoresis, Western blotting, Microarray, ELISA and column chromatography. Meanwhile, application of colorimetric test with gold nanoparticles had a special place for quick and efficient detection of biomolecules. In this study, first the *GUS* reporter gene transformation was done using *Agrobacterium tumefaciens* LBA4404 to melons mildew Zabol (*Cucumis melo*). After that the extraction of proteins were performed to study gene expression using polyacrylamide gel in the presence of sodium dodecyl sulphate and colorimetric assay and spectrophotometry techniques. BSA protein was considered as a standard protein. The extracted protein concentration was 330 µg/mL achieved by Bradford assay. Colorimetric assay of standard protein with sodium chloride and potassium chloride salts was done and threshold of protein detection for these salts was assessed to be 1 mg/mL and 100 µg/mL, respectively. The results showed that in comparison with other methods of proteomics study, application of gold nanoparticles the sensitivity with their convenience and low cost are a good way to study the biomolecules.

Keywords: Gold nanoparticles, protein, vertical electrophoresis, *GUS* reporter gene



University of Zabol
Management Graduate
School of science
Department of Biology

The Thesis submitted for the degree of M. Sc in Genetic

**Investigation on *GUS* reporter gene transient expression
at protein level by gold nanoparticle**

Supervisors

Dr. F. Haddadi

Dr. H. Kamaladini

Advisor

Dr. A. Niknejad

By

S. Shabani

February 2017