Abstract:

The Wheat is one of the most important food crops in Iran and considering the role of nanotechnology in the crops production, the survey of nanoparticles effect on its developmental processes is very significant. The purpose of this study was to investigate the effect of silver nanoparticles on germination traits and cytogenetic characteristics for divided cells in ten varieties of wheat at in vitro condition. Germination and mitotic characters were investigated for Wheat cultivars in four concentrations (1000, 5000, 10000 ppm and zero or check) of silver nanoparticles with four replications in factorial design based on completely randomized. The traits of root and shoot length, root to shoot ratio, rate, percentage, time average and index of germination, daily mean germination, seedling emergence and vigor index were measured. In cytogenetical studies ten field of microscopic view were studied after pretreatment with Levitsky solution, hydrolyzed with 1 normal NaOH, staining of root tip meristem and preparing of microscopic slide and the traits of total number of cells, number of dividing cells, the number cells of interphase, metaphase, prophase, anaphase and telophase, related traits to mitotic deviation include sticky, messy and C- metaphase, sticky and messy anaphase and anaphase bridge, sticky telophase and telophase bridge, micronuclei, fragment and chromosomes lagger, mitotic, anaphase and deviation index were measured. The results of variance analysis showed a significant difference between cultivars and between different concentrations of nanosilver for most of the traits in the two experiments and between the cultivars significant differences do not observed only for traits of total number of cells and the number of interphase cells. Based on the results of mean comparison, principal component analysis and cluster analysis, the highest rate of germination were observed in check level and followed at the 1000_{ppm} level and the germination characters were a significant decreasing with increasing of nano concentration. The cultivar of Orom and Parsi had the highest value of germination characters and were superior. On the other hands, the results of mean comparison, principal component analysis and cluster analysis for cytogenetically study were showed the most metaphase index at check level and with increasing the concentration of nano to 1000_{ppm} the metaphase index were decreased, but mitotic index were increased and followed at 5000_{ppm} level mitotic index were decreased but deviation index were increased, which finally were showed increasing all mitotic characters at 10000_{ppm}. The cultivar of Chamran, Mehrgan and Orom had the highest mitotic and metaphase index and the lowest deviation index. The study of relationships between two group of germination and cytogenetically traits by mantel's test do not showed a significant relationship.

Key Words: Wheat, cytogenetic, mitotic index, completely randomized design, germination.

University of Zabol
Graduate school
Faculty of Agriculture

Department of Plant Breeding and Biotechnology
The Thesis Submitted for the Degree of M. Sc

Effects of nano silver on cytogenetical and germination characteristics in Wheat

Supervisors

Dr. A. A. Emamjomeh

Dr. M. Farshadfar

Advisors

Dr. H. Safari

Dr. B. Fakheri

By:

S. Hatami

February 2017