

**Republic of Iraq**  
**Ministry of Higher Education**  
**& Scientific Research**  
**AL-Muthanna University**  
**College of Science**  
**Department of Biology**



# **Effect of ZnONP and SA spraying in growth and some physiological trails for two cultivars of wheat *Triticum aestivum* L.**

A Thesis Submitted to the Council of collage of Science /Al Muthanna  
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## Abstract:

The current study is conducted in the green house of the research station in the Department of biology /College of Science /Al-Muthanna University. The experiment was conducted during the growing season on 10/11/2022 and the end date is 1/4/2023. The effects of Salicylic acid were tested by spraying it on the leaves cultivar of wheat (*Triticum aestivum* L) *T. aestivum* c.v *abaa 99* and *T. aestivum* c.v *Abo graib* as the first treatment (T1), while the second treatment (T2) was spraying zinc nanoparticles on the same plants., the synergistic effect (T3) of both previous treatments together Finally (T4) was control. with three concentrations (0, 50, 75, and 100) ppm, respectively, for all the above-mentioned treatments, on growth and some physiological aspects. The experiment was carried out with three replications for each concentration based on a completely randomized design (CRD).

Pre-prepared zinc oxide nanoparticles and Salicylic acid powder were used. The results of the statistical analysis and analysis of variance indicated that there were significant and numerical differences that included each of the two cultivars, treatments and concentrations previously mentioned above.

The superiority of the T3 treatment at a concentration of (75 / ppm). The cultivar *abaa99* was better in all aspects of vegetative traits such as plant fresh weight and root 0.329&1.861cm respectively, leaf surface area 43.778 cm<sup>2</sup>, plant height 80.00 cm and root length 45.00cm. As well as in all physiological aspects, such as the stability of the cell membrane 24.490 %, the content of phosphorus 0.519mg/g, zinc 371.922mg/g, nitrogen 0.764 mg/g, carbohydrates 60.030 m/g, and protein 4.775 mg/g. Infiltration of K<sup>+</sup> 49.044 and Na<sup>+</sup> 230.966 ions, and also a positive effect on increasing the amount of chlorophyll 2.285 mg/g. Also, there was a clear positive

effect of the Treatment (T1, SA foliar spraying, with a concentration of 50 and 75 ppm) on the plants, with the superiority of the cultivar *abaa99* than *Abo graib*.

On the other hand, the results of the foliar spraying of ZnONPS at a concentration of (75 and 50 ppm) showed a better effect than the (T1) treatment in increasing the activity of enzymes Glutathione Peroxidase (GPX), Superoxide Dismutase (SOD), and Catalase (CAT) of *abaa99* cultivar 9.085&1.351, and 8.330 mg/g, respectively. concerning Zinc 362.110mg/g.

On the other hand, there was the least significant effect of T3 treatment (the synergistic effect of ZnONPS & SA at a concentration of 100 ppm) for *Abo graib* cultivar in Vegetative aspects: plant height 40cm, root length 15cm, leaf surface area 6.432cm<sup>2</sup>, fresh weight of stem and root (0.023& 0.343) g, respectively. Also in the physiological aspects, stability of the cell membrane 94.655 % and nitrogen content 94.655%. 0.280 mg/g, zinc 24.222 mg/g, phosphorus 0.243 mg/g, in addition to carbohydrate content 40.200mg/g, protein content 1.750mg/g, chlorophyll 1.327 mg/g, and leaching K<sup>+</sup> 48.183% and Na<sup>+</sup> 6.215 %.

The response of wheat plants to the synergistic treatment of each of SA + ZnONPs more than the rest of the other treatments that are spraying SA alone or spraying ZnONPs. The study showed a very clear effect of concentration 75 when compared to the rest of the other concentrations and for each of the SA + ZnONPs together or both separately.