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EFFECT OF SEED TREATMENT WITH PLANT GROWTH REGULATORS UNDER STRESS CONDITIONS IN MUSTARD

Mustard is an important cash crop, which has a long history of cultivation and is an important oil crop all over the world. Meanwhile, It can also be used as a medicine, which has been proved to have a key role in cancer prevention and bactericidal, and it has attracted more and more attention. Plant growth compound regulator (PGR) shows prominent effects on plant metabolism, resistance, growth and stress resistant.

The objective of the study was to evaluate the effectiveness of PGRs on the root and shoot morphology of mustard during the seedling stage under simulated drought conditions, which would provide a theoretical basis for the practice of compound growth regulators in mustard and simplify cultivation and management. PGRs were applied for the pre-treatment of seeds at the recommended dose.

ach bag was added with 110 ml distilled water or 10% PEG-6000 solutions to simulate drought stress. All experiments were conducted in the growth chamber (day/night temperature at 28/20 °C) with the provision of 14h light (350 μmol /(m^2·s)) as well as 10 h dark. The germination rate was counted after 2 days of culture, and the growth parameters of root and shoot of 15 seedlings were calculated after 6 days of treatment. The fresh weight of five plants was weighed for one repetition and divided into three replicates.

The effects of PGRs on germination rate under drought stress. As shown the germination rate of the two varieties changed under different treatments. In Felicia, the germination rate under T1 reached the minimum value (81%) compared to the CK1 (89%), CK2 (87%), and other treatments. The germination rate reached the maximum with T7 and T8, both by 90%, and was higher than normal growing conditions (89%). For Prima, the germination rate of T1 (89%), T2 (88%), and T3 (87%) was slightly higher than that of CK1 (83%) and CK2 (85%). Besides, there was a difference between the two varieties in terms of germination rate. The germination rate of Felicia was higher (89%) than that of Prima (83%) under normal conditions. Although the sensitivity of Prima and Felicia to PGRs was different, the difference was not significant.

The results indicated that drought stress reduced the root fresh weight of Felicia and Prima by 22.22% and 17.93% compared with the CK1. The root fresh weight in Felicia increased after the application of T3 and T5 by 24.28% and 17.85%. However, the application of T1 and T2 significantly reduced the root fresh weight of Felicia by 36.43% and 20%, and the root fresh weight of T4 was not different compared with CK2. For the root fresh weight of Prima, the application of T5 and T8 was 23.96 and 17.62%

higher than CK2, and T1, T2, T4, and under T7 it was slightly lower than CK2. In addition, there was no significant difference between all treatments regarding the shoot fresh weight of Felicia and Prima. Compared with the CK1, the effect of drought stress on root fresh weight was greater than shoot, indicating that root was very sensitive to drought stress.

An extensive root system is advantageous to support plant growth during the early crop growth stage and absorb more water from the rhizosphere. The total root length of mustard consists of the main root and lateral roots. The root system architecture (RSA) was determined by multiple environmental factors. In Felicia and Prima, drought stress (CK2) reduced TRL (total root length) by 12% and 15% compared to normal conditions (CK1), indicating that drought stress inhibited the growth of the mustard root. In Felicia, the application of T3 and T4 significantly increased the root length by 3.3% and 8.2%, while other treatments were lower than CK2. For Prima, the PGRs increased the root length and the surface area under drought stress, except for T4 and T7. Notably, the application of T8 had a remarkable effect on the root growth by increasing the root length (18.12%), surface area (28.57%), diameter (6.06%), and volume (37.76%).

The effects of PGRs on the shoot growth of mustard under drought stress. For Felicia, the PGRs promoted the growth of the shoot under the drought condition, except for the T6 treatment group. Leaf area, stem length, and stem volume after the application of T3 increased significantly compared with CK2 by 24.7%, 19.4%, and 30.9%, respectively. For the shoot growth of Prima, the application of T8 significantly increased the leaf area and stem volume by 15.9% and 32.3%, while there was no significant difference between other regulators and CK2.

As the result, the pre-treatment of seeds with PGRs affected seedling growth, but the sensitivity of varieties and plant tissues to PGRs exhibited differences. To sum it up, the application of T3 (ANTISTRESS) can improve the growth of Felicia under drought stress, and T8 (FAST START) was beneficial to the growth of Prima.