

Utilization Efficiency of Growth Regulators in Wheat under Drought Stress and Sandy Soil Conditions.

Drought stress and nutrient status are highly important for plant growth and productivity. Two field experiments were conducted during two consecutive seasons (2017–2018 and 2018–2019) at El-Molak, Abo-Hammad, Sharkia, Egypt. This work was conducted under sandy soil conditions to evaluate the effects of foliar application with growth regulators (PGRs) such as cycocel (CCC), applied at 0, 500, or 1000 mg L⁻¹, and/or salicylic acid (SA), applied at 0, 0.05, or 0.1 mM on the productivity as well as improving drought tolerance of three wheat cultivars, i.e., Gemmeiza 11, Misr 1, and Giza 171 under three irrigation intervals, i.e., 10, 15, and 20 days. Foliar spray was given at 35 and 50 days after planting (DAP). The obtained results showed that mean squares as a result of the main effect and first- and second-order interactions were significant ($p \leq 0.01$) for all studied traits. The application of SA increased total chlorophyll content and flag leaf area (cm²) while the number of days to 50% heading was decreased; however, the number of spikes m⁻², protein and proline contents were increased with the application of CCC. The cultivar Misr 1 outperformed the other cultivars in the most studied traits. Estimates of heritability in the broad sense (h²_b) were, on average, higher in five physiological traits than other agronomic traits, and the highest estimate of h²_b (95.1%) was shown by the number of days to 50% heading followed by protein content (91.90%). Among the interactions between irrigation and growth regulators, the I(10) × SA(0.1) recorded the highest flag leaf area (cm²), SPAD value, number of grains spike⁻¹, 1000-grain weight (g), and grain yield (t ha⁻¹). Among the interactions between irrigation and cultivars, the I(10) × Misr 1 recorded the highest flag leaf area (cm²), SPAD value, number of grains spike⁻¹, and grain yield (t ha⁻¹). Among the interactions among irrigation, growth regulators and cultivars, the I(10) × SA(0.1) × Misr 1 recorded the highest flag leaf area (cm²), number of grains spike⁻¹, 1000-grain weight (g), and grain yield (t ha⁻¹). Correlation coefficient between grain yield (t ha⁻¹) and each of the number of days to 50% heading, flag leaf area, total chlorophyll content, number of spikes m⁻², number of grains spike⁻¹, and 1000-grain weight was positive and significant. Three main factors for the studied variables were created from the application of the factor analysis technique. Grain yield ha⁻¹ (Y) can be predicted by the method of forwarding stepwise through applying the automatic linear regression analysis. Besides, the best prediction equation of grain yield ha⁻¹ (Y) was formulated as: $\hat{Y} = -14.36 + 0.11$ number of grains spike⁻¹ (NGS) + 0.09 1000-grain weight (THW) + 0.04 number of spike m⁻² (NSm) + 0.03 days to 50% heading (DF) + 0.02 total chlorophyll content (TC) with adjusted-R₂ (87.33%).