The Combined Effect of Soil Salinity and CCC on Dry Matter Accumulation and Yield of Wheat Plants

A. I. GABR, M. M. SHARAKY* and S. A. EL-ASHKAR*

Department of Agricultural Botany and Plant Pathology, Faculty of Agriculture, Ain Shams University, Shobra El-kheima, Cairo, Egypt

Abstract. The rise in soil salinity level tended to decrease shoot dry weight, and grain yield per plant and, to some extent, weight of 1 grain. This effect was usually more pronounced in the presence of CCC. On the other hand, the shoot dry weight was increased by CCC in salinity absence but the reverse at 0.8 % salinization degree. The grain yield per plant was raised by CCC in the presence or absence of salinity, particularly in the latter case. The dry matter accumulation in the shoot system (at earing stage) rather than grain yield tended to be much more affected, whether regarding the negative response to salinity or the positive one to CCC.

The adverse effect of salinity upon growth and grain yield of wheat plants has often been reported in the literature (e.g. ASANA and KALE 1965, RAUF 1970). The possibility that CCC could improve wheat salt tolerance has rarely been examined with contradictory results (EL-KOBIA et al. 1970, LAURA and IJNANI 1973). Accordingly, it was desirable to carry out tests employing both the salinity and CCC at various levels and applying the latter with different methods. This was achieved in the present work, which aimed mainly to determine the efficiency of CCC in overcoming the deleterious effects of salinity upon growth (as evidenced by dry matter accumulation) and grain yield of wheat.

Material and Methods

Two experiments were carried out during the years 1973—1975 in the greenhouse of the Faculty of Agriculture, Zagazig University, Zagazig, Egypt.

Different combinations of salinity and cycoecel "CCC" [(2-chloro-ethyl) trimethylammonium chloride] were applied. Wheat plants (Triticum vulgare cv. 'Giza 155') were grown in earthenware pots, 35 cm in diameter, with inner coating of three layers of bitumen; the bottom was tightly closed. Every pot contained 8 kg air-dry Nile-clay soil. Seeds were sown on 21 November and the seedlings were thinned two weeks later to 15 plants per pot.
Fig. 1. Average dry weight of shoot system of wheat plants at different developmental stages in relation to the combined effect of salinity and CCC. The vertical bars denote the L.S.D. at 5% level for salinity × CCC interactions (the 1973–1974 season).

A chloride type of salinization was applied (Strogonov 1962). The components of salt mixture used were: 10% MgSO₄, 1% CaSO₄, 78% NaCl, 2% MgCl₂ and 9% CaCO₃.

In the 1st season five salinity levels were used: 0.0, 0.2, 0.4, 0.6 and 0.8% (on soil dry weight basis). In the 2nd season, however, the first four