A HYDROPONIC APPROACH TO EVALUATE RESPONSES TO SALINITY STRESS IN COTTON J. Dever Texas AgriLife Research Lubbock, TX D. Auld H. Zhang N. Abidi Texas Tech University Lubbock, TX J. Burke USDA Lubbock, TX

Abstract

Salinity has become a problem to crop agriculture in many parts of the world. NaCl in particular, is an organic compound that imparts mostly a negative effect on the overall plant performance. Initially NaCl resides in the soil surface and over time moves deeper in the ground. It is most found in the water and absorbed by the roots. An excessive NaCl deposition interferes with the overall plat performance and slows down the ability of plants to uptake water. Subsequently, salt reduces photosynthesis and inducing wilting and in some cases, death. The objective of this research was to quantify some of the responses to salt stress induce by adding various NaCl concentrations and over time. A wild cotton accession cultivar, and various cultivars, and transgenic lines were used for the study. Using a hydroponics system the study was carried out in a greenhouse setting and under controlled ambient. The results showed a reduction of fresh and dry biomass, as well as loss of root integrity. Other negative morphological characteristics were decreased plant height, overthrow of radical, leaf damage, and reduction of the leaf surface area.

Introduction

Soil decays and splits into different organic compounds. When plants are introduced into that environment, they are exposed to the various minerals. In the weathering process NaCl is captivated by most plants. Their ability to adapt to the NaCl depends on the absorption and relocation of the NaCl to the sinking regions in the plant. Later released, the plants respond as susceptible, tolerant or resistant to the NaCl concentrations. It varies among species and genotypes. The objective of this research was to quantify some of the negative characteristics induce by the NaCl. Using a hydroponics system a large population of plants was screened in a greenhouse setting and under controlled conditions. It was concluded that salinity imparts a negative effect on the overall plant performance. Quantitative and qualitative results showed some effects imparted by NaCl on the wild accession as well as on the various cultivars and transgenic cotton genotypes.

Methods

Seedlings are planted in germination paper towels, and germinated at 22 degrees centigrade, at 22 % humidity for 6 days in the germinator. Germinated seeds are placed into the hydroponics tanks utilizing four replications. Three thousand parts per million of salt are added every forty eight hours. Plants are then evaluated every 48 hours for 1 month. The plants that survive the salt treatments are rescued and further studied in a soil medium.

Results

Results indicated an obstruction of nutrient up-take and various levels of toxicity among the various genotypes.