Summary

In recent years the problem of soil salinity assumes particular importance because of use in agriculture of high doses of fertilization and deepening deficit of fresh water leading to necessitates artificial irrigation of fields or even the use of desalted sea water. Furthermore, the use of large amounts of NaCl on streets and roads in winter causes additional danger of accumulation of Na^+ and Cl^- in the soil and consequently in plants. Sensitivity of crops to salinity varies widely. This is undoubtedly effect of different plant mechanisms of tolerance to this factor.

In the work there was a view presenting that some species of monocots, commonly cultivated as glycophytes, can demonstrate a natural tolerance for elevated salt concentration in the soil. In addition, it was assumed that not all of the physiological and metabolic processes are equally susceptible to the effects of salinity, so it is possible to select some parameters of these processes as indicators of susceptibility or tolerance to this kind of stress.

The aim of the dissertation was to investigate of salinity influence on the physiological and biochemical parameters of processes occurring in plants of bread and durum wheat, maize, Sorghum and Giant Miscanthus and indicate which of them demonstrates less sensitivity to salt stress. Changes in these parameters within plant response to salinity can indicate defence mechanisms initiating in studied crops. Additionally, the aim of this work was to study of stress alleviation using alternative plant watering with sweet and saline water as well as by plant treatment with some biostimulants.

The study was realized in three experiments. Each of them was performed in controlled conditions in glasshouse or in a special preparing pools filled with perlite. The innovation of this research was the application of salinity stress from the beginning of vegetative growth of plants (sowing or rhizomes' planting), conversely to most studies reported in the literature, when salt stress was introduced in the later developmental stages of plants.

Obtained results indicate that seed ability to germination in saline soil is a fundamental feature deciding plant cultivation in these soil conditions. Durum wheat seeds demonstrate highest, while maize and sorghum ones the lowest tolerance to salinity. The increase in dry matter content is the best parameter reflecting the degree of plant tolerance to salinity. Salinity decreases considerably gas exchange in leaves, causing fresh and dry mass reduction. Among studied plant species bread wheat cv. 'Banderola' is most tolerant to salinity. Sorghum demonstrates higher tolerance to salinity in the range of 0–150 mM compared to maize,

however maize plants show even an increase in dry matter of plants grown at 20-100 mM NaCl.

Miscanthus tolerance to salinity depends on initial rhizome weight planted to ground and as well as on high amount of proline and potassium ions accumulated in leaves. Miscanthus can be cultivated by 100 mM of NaCl. Rhizomes planted to ground with 200 mM of NaCl do not produce any shoots, however they remain alive and regenerate quickly after transfer to salt-free soil. Salt level in range of 0-150 mM increases potassium amount in Miscanthus leaves, but K^+ ions are accumulated in greater amount in rhizomes compared to leaves. In turn, Na^+ ions are accumulated in greater amount in leaves than in rhizomes. Sorghum and maize do not reduce the K^+ ions content in the leaves in the salinity of 120 mM NaCl, which can indicate their high degree of tolerance to the stress.

Biostimulants such as Asahi SL**,** epibrassinolide and zearalenone used in the experiment, influence specifically on studied parameters of plants cultivated in saline soil. No stimulant used could be ordered as universal to stress alleviation. Alternative watering with sweet and saline water does not alleviate salt stress effects on investigated processes.