

Comparison of growth-biomass, physiological and biochemical adaptations in poplar clones under progressive drought stress

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ABSTRACT : Drought stress is one of the most serious worldwide problems for plant growth and development. In our investigations, clone G-48 of *Populus deltoides* different levels of drought on growth, chlorophyll status and photosynthetic characteristics was studied. Poplar clones showed better growth characteristics under normal irrigation as compared to stress, assessed through better plant height, number of leaves, biomass accumulation, proline, malondialdehyde, sugar accumulation and damage to photosynthetic pigment in control (100% of field capacity) condition as compared to different irrigation levels, i.e. 75, 50 and 25% of field capacity. It was experienced in our investigation that poplar seedlings can withstand drought up to 75% of the field capacity without much loss in plant height, number of leaves, biomass accumulation and harvest index. But beyond this level of drought, plant growth and biomass severely decreased to an extent that plant cannot withstand their further better growth. However, the pattern of photosynthetic CO₂ assimilation rate, transpiration, growth and biomass allocation were affected in different ways for poplar seedlings with notably a decrease in specific leaf area and harvest index at all the levels of drought stress. It was analysed that for better wood yield poplar seedlings should avail either optimum amount of water (amount nearly equal to field capacity of soil) or maximum withdrawal up to 75% of field capacity up to seedling establishment period (60 days). Furthermore, this study manifested that acclimation to drought stress are related with the rapidity, severity and duration of the drought event of the poplar species.

Key Words: Poplar (*Populus deltoides*), clone G-48, growth-biomass, drought stress, photosynthesis, malondialdehyde, transpiration.