The effect of different water regimes on growth, gas exchange rate and water relations of three varieties of kenaf (Hibiscus cannabinus L.) under glasshouse condition

ABSTRACT

Kenaf (Hibiscus cannabinus L., Malvaceae) is a warm season annual fiber crop closely related to cotton (Gossypium hirsutum L., Malvaceae) that can be successfully produced in different areas most importantly producing fiber. The effects of water stress on growth, gas exchange rate and water relation of three different varieties of kenaf, namely Fuhong 991 (FH991), V36 and Kohn-Kaen 60 (KK60), were investigated. The plants were grown on a loose-textured clay soil, Serdang series (soil texture class by USDA) in the glasshouse at Universiti Putra Malaysia (UPM). Three watering regimes consisting of 100% of field capacity (control), 50% of field capacity and 25% of field capacity were imposed on the plants. Each water treatment was replicated three times in a randomized complete block design as split plot arrangement The objectives of this study were to evaluate growth parameters of different varieties of kenaf and determine gas exchange rate and water relationship of these varieties under different water treatments; therefore, throughout a period of 90 days, parameters of growth, gas exchange attributes and water relations were measured within three regular intervals of every three weeks. Shoot height, stem diameter and total biomass were the most prominent parameters of kenaf fiber yield in which variety FH991 with water treatment of 100% field capacity attained the highest values (242.67 cm for shoot height, 14.3 mm for stem diameter and total biomass of 93.26 g/plant) compared to others. Kenaf avoids drought by leaf rolling and stomata closure. The water potential went down as low as -1.5 MPa under severe stress. The results of this study showed that varieties and different water treatments significantly differed in growth parameters, water relations and gas exchange attributes, so that the greatest values belonged to variety FH991 at water treatment of 100% field capacity.

Keyword: Field capacity; Shoot height; Stem diameter; Total biomass; Stomata closure; Water potential