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ABSTRACT

In this study two experiments were conducted at Environmental and Natural Resources Research Institute nursery at Khartoum during the period from mid- October 2004 to mid- June 2005, to study the effect of salt stress (irrigation with saline water and soil salinity) on three acacia species *Acacia seyal*, *Acacia mellifera*, *Acacia tortilis* and *Eucalyptus camaldulensis*. The experiments were conducted under nursery conditions with no control of temperature and no supplementary lightings.

In the first experiment (irrigation with saline water) seedlings were irrigated with water containing five levels of sodium chloride (0, 250, 500, 1000, and 1500 mg l⁻¹) for three months. In the second experiment the same soil used in the first experiment was reused again. However, the soils have different EC values resulting from irrigation with saline water. Growth parameters measured included stem elongation every two week and root length and shoot and roots dry weights at the end of the experiment.

Results obtained showed that salt stress significantly decreased plant growth (stem elongation) in all plants species. The degree of reduction in growth increased with increasing NaCl concentration in the irrigation water and soil salinity. Although, irrigation with saline water and soil salinity significantly reduced stem elongation, plants seedlings survived and continued to grow throughout the experiment period. Root and shoot dry weights were significantly reduced by salt stress. The degree of reduction was greater in shoots than in roots in all plant species and different salt concentrations. Among *Acacia* species *Acacia tortilis* and *Acacia mellifera* were more tolerant to salt stress than *Acacia seyal*. Result of this experiment revealed that *Acacia seyal* is sensitive to

salinity. *Eucalyptus camaldulensis* showed moderate response to salt stress. For afforestation and reforestation in arid land *Acacia seyal* is not recommended in saline soils. The other *Acacia* species and *Eucalyptus* may introduce in moderately saline conditions.

بسم الله الرحمن الرحيم

خلاصة الأطروحة

اشتملت هذه الدراسة على تجربتين متتاليتين فى الفترة من منتصف أكتوبر 2004- حتى منتصف شهر يونيو 2005م، لدراسة تأثير الملوحة (الري بالمياه المالحة وملوحة التربة) على ثلاثة أنواع من الشوكيات (*Acacia seyal, Acacia mellifera and Acacia tortilis*) ونوع واحد من البان *Eucalyptus camaldulensis*. أجريت هذه التجارب فى الظروف العادية بمشتمل معهد أبحاث البيئة والموارد الطبيعية، دون التحكم فى درجة الحرارة أو الإضاءة.

فى التجربة الأولى تم ري الشتول بمياه معالجة بخمس مستويات من ملح كلوريد الصوديوم NaCl، وتشتمل هذه المستويات على (صفر، 250، 500، 100 و 1500 ملجم/لتر) على التوالي وذلك لمدة ثلاثة شهور. فى التجربة الثانية تم استخدام التربة التى نتجت من التجربة الأولى، والتى تأثرت بالمياه المالحة وأصبحت لها مستويات ملوحة مختلفة بعد قياس درجة التوصيل الكهربائي لكل منها. تم قياس أطوال السيقان كل أسبوعين بينما أخذت قياسات طول الجذور والوزن الجاف للمجموع الخضري والمجموع الجزري فى نهاية كل من التجريتين.

النتائج المتحصل عليها دلت على وجود تأثير معنوي لمستويات الملوحة المختلفة على نقصان نمو طول الساق فى جميع النباتات وتناسب النقصان فى النمو طرديا مع الزيادة فى تركيز الأملاح مع الزمن. كما أوضحت النتائج أن جميع الأنواع قد تأثرت فى مستوى الملوحة العالية جدا (1500 ملجم/لتر) إلا ان الملاحظة تمثلت فى مواصلة نمو الأنواع المختلفة فى النمو بدرجات مختلفة من البطء طوال فترة التجربة. كشفت النتائج عن فروق معنوية فى نقصان الوزن الجاف للمجموع الجذرى والمجموع الخضرى وكان التأثير الواضح من حيث النقصان الأكبر فى الوزن كان فى المجموع الخضرى عن ما هو عليه فى المجموع الجذرى فى جميع الأنواع وكل مستويات الأملاح.

أبانت النتائج ان النوعين *Acacia mellifera* و *Acacia tortilis* كانت أكثر مقاومة للملوحة بينما أظهر النوع *Acacia seyal* درجة استجابة أقل وذلك فيما بين أنواع الشوكيات، بذا يكون هو أكثر الأنواع حساسية للملوحة. أما بالنسبة للنوع *Eucalyptus camaldulensis* أظهرت الدراسة انه معتدل الاستجابة لتأثير الملوحة. لأغراض التشجير وإعادة التشجير في أراضي السودان القاحلة ذات الملوحة العالية، فإن النوع *Acacia seyal* لا يوصى باستخدامه، أما نوعى الشوكيات الأخرى و النوع *Eucalyptus camaldulensis* يمكن استخدامه في الأراضي ذات الملوحة المعتدلة.