A study on cotton growth under saline conditions

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’To study the effect of different levels of diluted sea wateron growth characters, chemical components and yield of cottonplant, Giza 45 and Giza 81 varieties were grown in potexperiments during the years 1987 and 1988. conducted in thegreenhouse at the Agricultural Experimental Station in Giza •The soil was obtained from Giza governorate and 40 kg clay loamsoil was used in each pot • Salinity levels of diluted seawater were O(So). 10000(Sl) ,15000(S2) and 30000(33) ppm.Five growth periods were used; PI ’ P2 ’ P3 ’ P4 ’ P5 at20-48 , 49-71 • 72-94 , 95-117 and 118-140 days after planting,respectively, after growth period, it was irrigated withtap water •Vegetative growth characteristics were recorded as cottonplant height and leaf number after each growth period , andleaf area, as well as plant dry weight and chemical componentswere measured at 48 (Gl) , 94 (G2) and 140 (G3) days afterplanting • Daily notes for flowers numbers and flowering rateper week were recorded • Cotton boll production as number,weight and lint yield were mea~~red at G3•The obtained results could be summarized as follows;Pl~~t growth characters : ----------00 Diluted sea water at S3 decreased plant height, leaf numberand leaf area more than S2 and Sl ••• Cotton variety Giza 81 was affected with all salinity levelsmore than Giza 45 specially in leaf number ••• The first growth period was superior for decreas1.ng plantheight, leaf number and leaf area, and the ascending orderof the accumulation decreasing was PI / P2 < P3 < P4 < P5 ••• Fit equation among linear, logarithmic ,exponenatial andpower regression equations for plant height, leaf number andleaf area to every gr owt.hperiod was power regression equation(Y=ax b).Chemical components :•• Nitrogen, phosphorus and potassium absorbed by cotton plantvariety of Giza 45 al all stages ,’ere less than those taken upby Giza 81 • Giza 81 ’,’:amsor’eaffected v..l th saline wet er,salinity levels S2 and S3 Vleremore serious for the testedcotton varieties than Sl ••• Nitrogen, phosphorus and potassium content measured at Glwere prono1L~ced affected compared with the control ••• Nitrogen , phosphorus and potassium content measured at G2were more affected at PI than other growth periods •• 0 Nitrogen, phosphorus and potassium content measured at G3,were more affected at P3 than the other gr-owth periods.The ascending order v.a s P3(P2 (PI < P4 (” P5 ••• The two tested cotton varieties took up the same amount ofsodium, whereas, the logically highly sodium content wasnoticed under S3 and S2 more than under Sl • The highly sodiumabsorped Vias at P3 and the descending order was P3) P4 > P5 > <,P2 / PI •Cotton yield : ----------•• Though Giza 81 yielded dry weight more than Giza 45, the relativedry weights of Giza 81 was less than Giza 45 under Sl and S2 ••• The relative decrease was high at Gl under 82 and lowat GJ under 81 ••• 8J level decreased dry weights of the tested varieties morethan 81 level ••• Dry weight measured at G2 under PI was the most adverselyaffected than those of P2 and PJ ••• Dry weight measured at GJ under PJ was more decreased thanother gr-owth periods, while the ascending order under 81 wasP3 ” P2 .’ PI’ P4 ’ P5 ,the ascending order under 82and 83 was PI P2 ’ P3 ’-,P4 -; P5 ••• Flowers number per plant of Giza 45 were more than Giza 81 ••• The higher the salinity level, the more decrease in flowernumber per plant. The low salinity levels (51) slightlystimulated flowering ••• The two tested varieties under PI were more affected in theirflower number per plant than other growth periods • Thedescending order for the two salinity levels, was PI’; P ”- 2/,PJ / P4 ••• All growth periods accelarated flowering in Giza 45 but sanegrowth periods did that in Giza 81 ••• Fit equation among linear, logarithmic, exponenatial andpower regression equations for cumulative number per plantto every growth period was power regression equation(Y = a xb) ••• Boll retention in Giza 45 was more than in Giza 81 • Salinitylevels (81 and 82) affected on

boll retention for the testedcotton varieties, where, 82 has decreased boll retention morethan 82, ••• Boll retention of cotton plant at PJ was the most affectedunder 81, while at PI was the most affected under 82 and 8The less affected one was P5 under the three tested salinitylevels ••• Lint yield of Giza 45 was higher than that of Giza 81 • Whilethe higher lint yield of Giza 45 was the more decreased bysalinity level. S2 decreased lint yield more than Sl • Theascending order under Sl was P3 <. P2 PI' P4 <' P5 'while under S2 it was P2 (PI < P3 (P4 < P5• Thismeans that PI and P2 were more or less the same in reducinglint yield, while P5 represents the least effect •Relationship of soil soluble salts with plant chemical components ----------and yields :----------A •• Soil soluble salts and reactions: .....Considerable amounts of total soluble salts in the ~oil atevery growth period was found. The increasing of salinityaccumulation in the soil was accompanied with a decreasingsoil pH, that was slight between 81 and 82 • The change insoil pH values under salinity was wi thin 0.6 uni t of pH •B •• S.o.i.l..s.o.l.u.b.l.e..s.a.l.t.s..a.n.d..p.l.a.n.t..c.h.e.m.i.c.a.l..c.o.m.p.o.n.e.n.t.s.:..Simple and multiple regression cleared that Nand P contentwere negatively affected with soil soluble salt at allregression relations, but K , Ca and Mg are positivelyaffected with soil soluble salts at early growth periods(PI and P2) and negatively affected at later ones (Pand P5) • Sodium absorbed by cotton plant reveals positiveresponse at early growth periods.S.o.i.l..s.a.l.i.n.i.t.y..a.n.d..c.o.t.t.o.n..y.i.e.l.d.:..• • • Simple and multiple regression reveal that soil salinity atPI severely affected dry weight either than measured afterPI or after P3, ?ut no effect on that measured after P5 •Soil salinity at P2 had little effect on dry weight eitherthat measured after P3 or after P5, while soil salinity atP3was in the opposite trend. The mUltiple regressionequation. is ;• •• Soil salinity at the five growth periods decreased boll numberper plant and the contribution percent of PI' P2 ' P3 and P4were 22.35 , 10.74 , 55.90 and 10.74 % but P5 contributed inincreasing boll number with negligible percent 0.27 % • ThemUltiple regression equation is ;••• Multiple regression revealed that lint yield was affected bysoil salinity at growth period. The contribution percent ofsoil salinity on decreasing lint yield were 2.04 , 10.67 ,73.53 , 3.26 and 10.50 % at the five growth periods,respectively • The mUltiple regression equation is ;The effect of salinity on growth characters was morepronounced at the earlier growth periods while its effect onnutrient content, dry weight and boll retention was noticed atmedium growth periods •