Physiological studies on water requirments of onion plant (allium cepa)

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shown that the relations betweenuse and relative growth of onion were highlyin the three moisture levels i.e, wet, moist, andmedium, d significant. in the dry treatment.17) An a tempt was made to estimate potential evapotranspirationby tree methods i.e, Blaney and Criddle, Turc and modifiedPenman. The highest estimates were obtained from Penmanfollowed y Turc and the lowest values were found when Blaneyuse of P nman's method is preferable as it offers the possibilityle formula was used. It can be mentioned that theimportance of the various climaticfactors i determining the rate of water use under non-limitingsoil mois ure conditions.18) Crop coefficient was low at the initial stage (0.56), thenas the crop cover increased to reach a maximum atmid-se n (0.76) while at maturity it decreased (0.30).r uptake by onion roots was higher from the upper_ 15 em) where it reached more than 50%, while lessvalues ere removed from subsequent layers. The data hadshown t at increasing water deficit did result in an increase inmoisture removal from deeper layers.20) Wa er .and onion yield relations had proved that the bestlevel oil moisture to obtain maximum production, either astotal or as exportable yield, is from 40 - 45% depletion.21) Se evapotranspiration has been plotted against . onionyield an the quadratic function was found to be the best typeof such elation. It can be concluded that onion plant consumedfrom 284 to 30.14 cm water to produce maximum bulb yield.22) Wa er use efficiency values were 7.08, 8.36; 9.99, and. bulb per one cubic meter of water consumed respecrtreatments irrigated after the depletion of 20%, 40%,60% an 80% depletion in available water.23) Nit ogen percentage decreased in different organs ofonion plant, till it reached the lowest value after 120 daysfrom tr nsplanting.24) Le f blade has the highest value of nitrogen% as comparedwith t ose of neck or bulb, during the different stages ofgrowth.25) Soi moisture stress increased nitrogen percent.26} Af er curing bulbs have higher nitrogen rather than thoseobtain dafter 120 days which is due to the translocation ofnitrog form leaf blade and neck into bulb during curingperiod. data indicate the importance of curing for theof nitrogen in bulb and thereby increasing thenutritive alue of onion bulbs.27) . decreased phosphorus content.content of the bulbs was increased after curing.U _ E feet of soil moisture stress on onion seed production1) Data had shown that maintaining high soil moisture level byfrequent irrigations gave higher values of plant height.2) Early in the season (till 60 days), results had shown thatthe avai ability of soil moisture has no obvious effect of theight of the blades, stalks and mother bulb, and thent, Meanwhile, after 90 to 120 days, the values hadshown t e importance of keeping the soil wet to moist.optimafter the depletion of 60% in available water gavevalues of dry weight indicating the importance ofat that level, as the dry matter content is one ofexcellent indicator for plant growth behaviour.weight/plant and wei&ht of 1000 seeds (seed index)the same trend as the dry matter.- i55 -5) Average seed yield of onion was 194.2, 242.4, 320.0 and235.9 Kg(feddan respectively for treatments irrigated after thedepletion of 20, 40, 60 and 80% in available water. Theseresults s~ow that the medium level of irrigation out yieldedthe other treatments.6) Seaso~al evapotranspiration rates from onion seed crop werei 52.3 ,42.$,34.4, and 24.4 cm respectively for wet, moist, mediumI and dry Itreatments.These rates indicate that water consumptionincreased by decreasing soil moisture stress.7) The daily evapotranspiration by onion was presented as acontinuo function in the form:Y = a + bx + cx2where,relative growth period as a percentage.Y = daily water use by onion in mm/dayare the parameters of the function.This fu ction can predict the daily water use at any specificperoid f onion's growth.coefficient (xc) of onion (seed crop) was computedusing urc and Penman equations and the seasonal values were0.79 a d 0.62 respectively.9) Sta istical analysis revealed that the degree of relationseed yield and water deficit was a second class orquadrafic function in the form:!Y = 132.8 + 729.0 x - 830.2 x2where .]IR2 = 0.4137Yi = onion seed yield in Kg/feddanxi = retained soil moisture prior irrigation %This r~lation was found to be highly significant. To maximizeseed yield with respect to soil moisture level, differentiationmay offer the solution of this point as follows:dy/dx = 729.0 - 1660.4 x: X = (729.0/1660.4) = 0.44It was found that to optimize seed production, irrigation shouldbe applied when 56% of the available soil moisture is depleted.10) The quadratic function which gives the best description ofcrop response to water consumption is as follows:Y = 127.8 + 26.05 x - 0.3659 x2R2 = 0.4140where,y = onion seed yield in Kg/fed.x = seasonal evapotranspiration in cm.By differentiating the previous equation and equating the derevativewith zero seasonal water use which produces the maximumseed producrion can be obtained by defferentiation as follows:dy/dx "" 26.05 - 0.7318 xx ::;

(26.05/0.7318) ”” 35.6 em,It can tie concluded that to obtain the maximum seed productionof onions, the water consumed in complete evapotranspirationprocess should be 35.6 .cm,