Evaluation of some pearl millet (Pennisetum typhoides, L.) varieties under some cultural practices

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Evaluation o(some pearl millet (Pennisetum typhoides, L.) varieties under some cultural practicesResearch experiments were conducted at Shandaweel AgriculturalResearch Station; Forage Research Section; Agricultural Research Center.Two experiments were conducted in two growing seasons of 1994 and1995. Experiments were designed and implemented to evaluate yield;growth component, and quality of three fodder millet grasses(Hybrid, Nigerian and B.M.M. tall) fertilized with four nitrogenlevels (control, 40; 80 and 120 KglN/fed) and irrigated at threeirrigation intervals (7, 14 and 21-day).Experiments were layed out and statisticaly analyzed as splitsplit designe where irrigation treatments were randomly distributedin the main plot and nitrogen levels in the split plots and foddergrasses in the sub sub plots. Three individual cuts were obtained ineach of the two growing seasons. Meanwhile; combined analysis ofthe two seasons were analysed for the studied parameters in eachcut. Results could be summarized as follows:Prolonging the time elapsed between the irrigations caused asignificant continous decrease in fresh fodder yield of millet foreach of the three cuts as well as the total yield. Increasing nitrogen application levels caused a continoussignificant increase in fresh fodder yield of millet grasses. Thehighest significant increase was obtained when comparing anyof the applied nitrogen level (40, 80 and 120 Kg/fed) with thecontrol (no nitrogen application). However, 80 Kg nitrogen/fedlooks to be the most economical nitrogen application levelsince the highest level (120 Kg N/fed) did not cause anappreciable extra increase in fresh fodder yield.The minimum fresh fodder yield production was obtained fromgrowing B.M.M. tall millet as compared with Hybrid andNigerian millet grasses. This was true for each of theindividual three cuts and the total yield as well with significantdifferences. Higher fresh fodder yield was obtained fromHybrid and Nigerian millet grasses than for B.M.M. tall.However the difference in fresh fodder yield for the later twofodder millet grasses were flactuated within cuts with littlesignificant difference. These later two millet types proved tobe more or less similar in fresh fodder yield, and higher inproductivity as compared with B.M.M. tall fodder millet.The interaction effect of the applied three factors on freshfodder yield was significant. The highest fresh yield wasobtained when irrigation was at 7-day duration interval using80 Kg N/fed for Hybrid millet. whereas, the lowest fresh fodder yield was obtained when growing B.M.M. tall milletwhere it was irrigated at 21-day duration interval withoutnitrogen fertilization .Extending the time elapsed between irrigation intervals from 7to 14 and up to 21-day caused a significant continous reductionin dry yield with significant differences. However, it wasobviously clear that the magnitude of such reduction wasrelatively higher when irrigation interval increased from 7 to14-day rather than from 14 to 21-day.Narrowing the irrigation intervals of fodder millet grassescaused a significant increase in dry fodder yield for theindividual cuts and the total yield as well.Any of the applied nitrogen levels of 40, 80 and 120 Kg/fedcaused a significant increase in dry fodder yield as comparedwith the control (of no nitrogen fertilizer application).In general, application of eather 80 or 120 Kg N/fed producedthe highest dry fodder yield. In addition, differences in dryfodder yield among the intermediate nitrogen levels wererelatively of low magnitudes.Nigerian millet was the highest in dry yield as compared withthe other two grasses for the first cut and the total dry yield.whereas, Hybrid millet was the

highest in dry yield for thesecond and third cuts.The total dry yield of the grown three millet grasses could beranked in the following descending order: Nigerian millet (8.82ton/fed) > Hybrid millet (8.40 ton/fed) > B.M.M. tall millet(8.27 ton/fed). Differences in total dry yield of the three milletgrasses were significant with slight magnitudes.The highest dry fodder mille yield was obtained at the shortestirrigation interval (7-day) when growing Nigerian millet using40 Kg nitrogen fertilization per feddan. This result was true forthe three individual cuts and for the total dry yield as well.The lowest dry yield of fodder millet was obtained whengrowing B.M.M. tall millet where no nitrogen fertilization wasapplied and irrigation was applied at the longest durationperiod of 21-day where the interaction was significant. Thisresult was obtained for all of the individual cuts and the totaldry yield except for the second cut where Nigerian milletreplace the B.M.M. tall in producing the lowest dry yield.Highest dry yield was obtained when irrigation was at 7-dayduration interval using 80 Kg N/fed for Nigerian millet fodder.As the time elapsed between irrigations increased from 7 to 14and up to 21-day, height of plants decreased significantly. Thisresult was true for each of the three obtained cuts with differentmagnitudes.As the irrigation duration intervals increased from 7 to IS-daythe decrease in plant heights was somewhat lower as comparedwith the increase in irrigation interval from 14 to 21-dayespecially in the first two cuts.Increasing nitrogen application levels from 0, to 40, 80 and 120Kg/fed caused a continous significant increase in plant heightsof the grown fodder millet grasses. This was true for each ofthe three cuts combined over the two growing seasons.The highest increase in plant height of fodder millet wasobtained when nitrogen application levels increased from thecontrol and 40 Kg/fed as well as from 40 to 80 Kg per feddan.On the average Nigerian millet was the tallest one followed byB.M.M. tall millet with ignorable difference in height.whereas, Hybrid millet was of the shortest plants.Fodder millet plants of B.M.M. tall was of 208.05 em heightwhich was fertilized with 120 Kg N/fed and irrigated at 7-dayinterval.Narrowing irrigation intervals caused a continous significantincrease in stem diameter of the grown millet grasses. This wasfor each of the obtained cuts. In addition, such effect ofirrigation intervals was more effective for the first cut ascompared with second one.Increasing nitrogen application levels up to 80 kg/fed caused acontinous significant increase in stem diameter of the grownmillet plants for each of the three subsequent cuts.Stem diameters of the grown fodder grasses were of significantdifferences, however, such differences were of no specific trendamong cuts.Hybrid millet plants were of the thickest stem in the first cut,while Nigerian millet was of the thickest stems for the secondand third cuts with significant differences as compared with theother two millet grasses. No specific trend was noticed in stemdiameters. of the other grown millet grasses for each of theobtained three cuts inspite of the slight significant difference insuch trait.Hybrid fodder millet was of the highest stem diameter (1.29em) which was fertilized with 40 Kg N/fed and irrigated at 7-day interval with significant interaction effect.Number of tillers per millet plant decreased continously and i!f(significantly as irrigation intervals increased from 7 to 14 andup to 21-day. This result was true for the three individual cuts.The application of 40 Kg nitrogen per feddan significantlyincreased the number of tillers per millet plant as comparedwith the control. Extra slight significant increase in number oftillers per millet plant was obtained at the subsequent highernitrogen level (80 Kg/fed).Hybrid millet was of the highest number of tillers per plant,followed by B.M.M. tall, then Nigerian millet with someflactuations within cuts.Significant interaction effect between the applied factors wasobtained on the number of tillers per plant of the grown foddermillet grasses for each of the three cuts and over the twogrowing seasons. The heighest tillering behaviour wasdetected for Hybrid fodder millet, fertilized with 80 Kg N/fedand irrigated at 7-day interval.The highest number of leaves per fodder millet plant wasnoticed at the shortest irrigation interval of 7-day as comparedwith the longer interval of 14-day with significant differencesin all cuts combined over the two seasons. The obtained increase in number of leaves per millet plant byshortening the irrigation intervals was not that high inmagnitude in almost all cuts.Any of the applied nitrogen level caused a significant increase innumber of leaves per fodder millet plants as compared with thecontrol. This was true for each of the three consequative cuts.The highest increase in number of leaves per millet plants wasobtained by applying 40 Kg nitrogen per feddan as comparedwith the control. However, the subsequent increase in nitrogenapplication levels from 40 to 80 Kg per feddan caused a slightcontinous increase in this studied parameter with significantdifferences in the second and third

cuts Fodder millet B.M.M. tall was almost as leafy as the Hybridfodder millet for the first and the third cut and slightly less forthe second cut.Hybrid fodder millet was the highest in number of leaves perplant followed by B.M.M. tall, then the Nigerian fodder millet.The most leafy fodder plants were produced from Hybrid milletgrass fertilized with 40 Kg N/fed and irrigated at 7-day intervalwith significant interaction effect.The highest leaf area was obtained when irrigation was at 7-dayinterval, whereas the smallest leaf area was obtained whenirrigation was at 2I-day interval.-The applied nitrogen fertilization levels caused a continoussignificant increase in the top 5th leaf area of the grown milletplants up to 80 Kg/feddan.The highest effect of nitrogen on the top 5th leaf area per plantwas obviously clear when comparing between the applicationof 40 Kg per feddan and the control.The descending order in the area of the top 5th leaf of plantswas as follows: B.M.M. tall> Hybrid> Nigerian millet grassfor the first cut, being B.M.M. tall> Hybrid = Nigerian milletfor the second cut, and Nigerian> B.M.M. tall> Hybrid milletgrasses for the third cut.The highest top 5th leaf area behaviour was obtained forB.M.M. tall fodder millet fertilized with 80 Kg N/fed andirrigated at 7-day interval and the interaction effect wassignificant. It is generally noticed that the difference in the analysedchemical constituents were slightly small. This could be due tothe narrow range of the effect of the applied irrigation treatments. However, the trend was obviously clear aspresented previously.As the growth and the regrowth proceeded for the subsequentsuccessive cuts: crude protein (CP) content decreased, crude fiber(CF) content increased, ash content decreased, ether extract (EE)decreased, nitrogen free extract (NFE) increased and total digestiblenutrients (TDN) decreased.Such trend was noticed for each of the subsequent three cutswith different magnitudes where CF and NFE content increasedwhereas CP, Ash, EE and TDN contents decreased from theearlier to the later cuts averaged over the applied nitrogenlevels. Increasing irrigation intervals from 7 to 14 and up to 21-day causeda continous decrease in water consumptive use (WeD) of the grownfodder grasses from 3199 to 2313 and down to 1894 m3/fed,respectively for the first season, being 3238, 2403 and 1986m3/fedfor the second one.A slight continous increase in water consumptive use of the grownfodder millet grasss was obtained as nitrogen levels increased from0, 40, 80 and up to 120 kg/fed. The corresponding waterconsumptive use were 2384, 2437, 2517 and 2538 m3/fed for thefirst season, being 2462, 2516, 2589 and 2603 m3/fed for the secondone. Water consumptive use of the grown fodder millet grasses was notappreciabley affected under the circumstances of this study.However, Hybrid millet and Nigerian millet were almost similar intheir water consumptive use which was 2478 vrs 2471 m3/fed in thefITStseason and 2550 vrs, 2556 m3/fed in the second one. Water use efficiency (WUE) for the dry fodder millet yiledproduction increased as the applied irrigation intervals decreased.Values ofWUE were 2.87, 3.49, and 3.84 kg dry fodder yield/m' atthe irrigation intervals of 7-day, 14-day and 21-day, respectively forthe first season, corresponding to 3.01,3.59 and 4.01 kg dry fodderyield/nr' water for the second season.Any of the applied nitrogen levels caused an increase in WUE ascompared with the control. However, no appreciable difference wasobtained in WUE when applying 40 or 80 kg nitrogen per feddan.Meanwhile, the highest nitrogen application level (120 kg/fed)caused a slight ignorable reduction in WUE, Nigerian fodder millet was relatively but slightly higher in WUE ascompared with Hybrid and B.M.M. tall millets where there was noappreciable difference in WUE between the later two fodder millets.