

Figure 3: Effect of irrigation on pests infestations

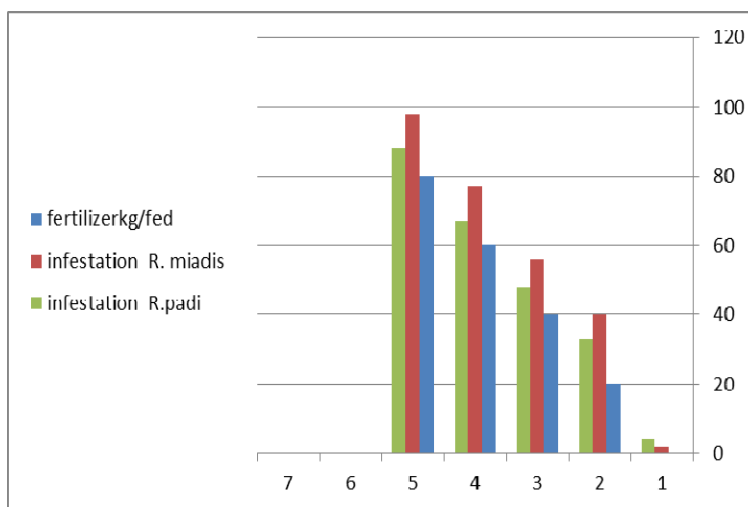


Figure 4: Effect of nitrogenous infestations on pests infestations

Figure 3 and 4 show the infestations of the insect pests after the irrigation period which show the infestations increased when the irrigation period increased. 2011,

### 3.4 Interaction

The interaction effect of nitrogen fertilization and irrigation intervals on fresh and dry matter yields were noted in Table (3&4). These data indicated that, in the 1<sup>st</sup> season, the highest increments were by addition of 80 kg N/ fed and 7 days irrigation intervals. This was true for the 1<sup>st</sup> or 2<sup>nd</sup> cut and total yield of the two cuts. The lowest increment with the same dose of N was by irrigation every 16 days. In the 2<sup>nd</sup> season, different figures were obtained, in the 1<sup>st</sup> cut, the highest increases were by 80 kg N and 13 days intervals followed by that under 10 days within irrigations, however, the lowest were by 16 days frequencies. In the 2<sup>nd</sup> cut, addition of the highest rate of nitrogen gave the highest positive effect on fresh yield under 7 days intervals, where the lowest effect were under 10 days intervals. The total FMY gave its higher values and increments by irrigation every 13 days and applied 80 kg N/fed. Furthermore, the differences in increment caused by the doses of N fertilizer were approximately equal when plants irrigated every 7 or 16 days. Concerning the water use efficiency, Data in Table (4) indicated that the values of WUE higher in the 1<sup>st</sup> cut in

the 2<sup>nd</sup> season followed by that in 1<sup>st</sup> cut in the 1<sup>st</sup> season. However, the lowest values were shown in the 2<sup>nd</sup> cut in the 1<sup>st</sup> season followed by that in the 2<sup>nd</sup> cut of the 2<sup>nd</sup> season. Increasing nitrogen increased the percentage of increment WUE. For the 1<sup>st</sup> cut, the highest values were by adding 80 kg/fed N. This was true under the different irrigation intervals in the 1<sup>st</sup> cut in both seasons. In the 2<sup>nd</sup> cut of the 2<sup>nd</sup> season, the response was similar but in the 1<sup>st</sup> season the response was differ which the highest values was by the 60 kg/fed when the irrigation intervals were applied at 10, 13 and 16 days, respectively. The highest increment was shown by 80kg/fed when plants irrigated every 7 days in the 1<sup>st</sup> cut of the 2<sup>nd</sup> seasons. On the other hand, nitrogen fertilizer addition decreased the values of WUE in the 2<sup>nd</sup> cut in the 1<sup>st</sup> season with the same irrigation interval.. Data in Table (4) pointed out, generally, that there was a positive relationship between N fertilization and water use efficiency. This was more pronounced in the 2<sup>nd</sup> cut in the 2<sup>nd</sup> season.

### 4. Discussion

This data was in line with those obtained by: [21], [22]. [23] examined the effect of irrigation frequency and show that the yield of maize straw decreased by widening or narrowing the irrigation intervals than 15 days. However, [4] found that prolonging of irrigation intervals more than 5

days decreased the fresh yield of sorghum grown in salt affected soil in Ras Sidr in Sinai. Meanwhile, [24] and [25], [26], [27] concluded that increasing soil moisture increased growth and yield of crops cultivated for forage or for seeds. Water stress led to cease the cell division and enlargement of different plant tissues which intern depressed the vegetative growth and dry matter accumulation [28] and [27]. Furthermore, water excess or water logging led to the decrement of oxygen surrounding the roots and this reflected on the root growth and water as well as mineral absorption ([29] and [30]). The regulation of N fertilizers and its effect on growth and yield of forages were reported by [32] [31] [25] reported that regression analysis revealed that the response of plant height, dry weight of leaves and stems and total dry weight/plant, stem diameter, number of green leaves, LA/plant and LWR showed a quadratic response to nitrogen fertilization and their characters could be increased by adding N levels up to 120 kg/ha. Moreover, [25] concluded that excess of the nitrogen levels directed the plants to more vigorous growth and intern reflected in fresh and dry matter yields. [17] and [34] confirm this finding. In addition, Dawson, *et al.* (2008) concluded that beneficial genetic traits include the ability to maintain photosynthesis and N uptake under N stress and the ability to extract soil N at low concentrations, perhaps through beneficial associations with soil microorganisms. In addition, breeding for specific adaptation to climatic and management practices so that crop uptake patterns match N availability patterns, while minimizing pathways of N loss, will be critical to improving NUE. Also, after nitrogenous fertilization the infestation percent increased due to the plat fertilization. [35], [36], [37], [38], [39], [40] [6] find the same obtains. [41] found that irrigation increased yield of brewing barley by 20% and fodder barley by 23%. High NPK rates up to 420 kg/ha increased the yield by 106 and 115 %, respectively. The combined effect of both measures increased the yield of brewing barley by 145% and that of fodder barley by 161%. The increasing of drought resistance by addition of fertilizers was reported by: [42] [25]. [22] and [43] Stated that Soil water and nutrients play an important role in increasing sorghum (*Sorghum bicolor L. Moench*) yields in the Vertisols of semi-arid tropics during post-rainy season. The highest positive effect on yields was obtained when nitrogen fertilizer added in wetted seasons. The promoting effect of nitrogenous fertilizers on the WUE was demonstrated by: [17] and [34] confirm this finding. Furthermore, [44] indicated that an increase in N applications is not a good strategy to compensate for a decrease of total biomass (TB) under drought stress conditions. We concluded that the effect of N fertilizer on TB depends on the availability of water in the soil, and that the amount of N fertilizer applied should be decreased under drought stress con. [45] mentioned that the sensitivity was greatest at the early stage ('leaf'), when a temporary soil water stress reduced the biomass production by up to 30% with respect to the control and WUE was 4.8 g kg<sup>-1</sup> (average of three seasons). These results help quantify the effects of water constraints on sweet sorghum productivity. The water stress in crops led to improve the WUE and AWP in different crops as found by several investigators: [10] ; and [46]. Furthermore, [47], [48], [49] confirmed the research results led to conclude that moderate drought is successful in increasing water productivity for various crops without

causing severe yield reductions. Nevertheless, a certain minimum amount of seasonal moisture must be guaranteed. Moderate drought requires precise knowledge of crop response to drought stress, as drought tolerance varies considerably by genotype and phenological stage. In developing and optimizing moderate drought strategies, field research should therefore be combined with crop water productivity modeling. The effect of regime on water use efficiency was reported by [50] on canola and [51] on sorghum. [52] mentioned that these irrigation regimes meant heavier water inputs with increasing irrigation frequency.

## References

- [1] Hegab, M.A. (1983). Physiological and biochemical responses of sorghum plants and grain yield for fertilization and irrigation regime in Saini. Ph.D. Thesis, Fac. of Agric., Ain Shams Univ., Cairo, Egypt.
- [2] Tag El-Din, S.S. and Assaeed, A.M. (1995) Effect of phosphorus fertilization and irrigation frequency on yield and protein content of Alfalfa. J. King Saud Univ., 7(1): 49.
- [3] El-Afandy, Kh. T.; Mourad A.F. and Latif, S.J. (1999). Effect of bio-fertilizers and irrigation intervals on growth, yield and yield components of some sorghum cultivars under salinity conditions as Wadi Sidr south Saini. Annals of Agric. Sci. Moshtohor, 37 (4): 2135.
- [4] Nassar, Zenab, M.; Nour El-Dien, Nabiela, M. and El-Hussanien, A.A. (2000). Effect of moisture stress and re-soaking with IAA on forage yield of *Sorghum bicolor L.* grown in salt affected soil at Wadi Sidr. Ann. Agric. Sci., Ain Shams Univ., Cairo, Egypt, 45 (1): 201 - 214.
- [5] Abdalla, S.O, Ahmed, K.M. and Schakchouk, F.M. (2004). Comparative studies in two forage grass species under different sources of nitrogen fertilizer and water regime at South Saini, Egypt. J. Agron., 26: 33-48.
- [6] Sabbour, M, M. 2006. Effect of some fertilizers mixed with bioinsecticides on the potato tuber moth *Phthorimaea operculella* infesting potato in the field and store. Pak. Of Biol. Sci. (1) 10: 1929-1934.
- [7] Sabbour, M.M , 2007. Evaluations of some entomopathogenic fungi and the predator *Coccinella septempunctata* against cereal aphids in Egypt, 2007. Egypt. Bull. ent. Soc. Egypt. Econ. 33: 165-174.
- [8] Sabbour, M. M. and A. F. Sahab 2007. Efficacy of some microbial control agents against *Agrotis ipsilon* and *Heliothis armigera* in Egypt. Bull. N. R. C. Egypt. 32: 561-571.
- [9] Sabbour, M.M and Shadia E-Abd-El-Aziz 2007. Efficiency of Some Bioinsecticides Against Broad Bean Beetle, *Bruchus rufimanus* (Coleoptera: Bruchidae). Res. J. of Agric. and Biol. Sci. 3(2): 67-72.
- [10] Gao, S.G.; Wang, W.J. and Guo, T.C. (2004). C-N metabolic characteristics in flag leaf and starch accumulating developments in seed during grain filling stage in two winter wheat cultivars with different spike type. Acta Agron., Sin., 29(3): 427-431.
- [11] Hu, Y.C.; Shao, H.B.; Chu, L.Y. and Gang, W. (2006). Relationship between water use efficiency and Production of different wheat genotypes as soil water deficit. Colloids and Surfaces B: Biointerfaces, 53: 271-277.

- [12] Sabbour, M.M and Abbass, M.H.2007. Efficacy of some microbial control agents against onion insect pests in Egypt. *Egypt. J. boil. Pest. Cont.* 17: 23-27.
- [13] Sabbour, M. M and Hany, A. 2007a. Controlling of *Bemisia tabaci* by *Verticillium lecanii* and *Paecilomyces fumosoroseus* in potato field. *Egypt. Bull. ent. Soc. Egypt*, 33:135-141
- [14] Sabbour, M. M and Hany, A. 2007. Evaluations of some entomopathogenic fungi and *Trichogramma evanescens* on the potato tuber moth in the field Egypt. *Bull. ent. Soc. Egypt. Egypt. Bull. ent. Sco. Egypt*, 33: 115-123
- [15] Sabbour, M. M and Abdel-Rahman, A . 2007. Evaluations of some terpenes and entomopathogenic fungi on three sugar beet insect pests. *J. Boil. Pest. Cont.* 17:22-29.
- [16] Sharma, R.P.; Dadheech, R.C. and Jat, L.N. (2000). Effect of atrazine and nitrogen on weed growth, yield of sorghum. *Indian J. of Weed Sci.* 32(1/2): 96-97.
- [17] Sabbour, M, M. 2006. Effect of some fertilizers mixed with bioinsecticides on the potato tuber moth *Phthorimaea operculella* infesting potato in the field and store. *Pak. Of Biol. Sci.* (1) 10: 1929-1934.
- [18] Sabbour.M.M.and M. H. Abbass, 2006. The role of some bioagent mixed with some fertilizers for the control of onion pests. *pak. J. Appl. Sci.*2(9): 624-628.
- [19] Li, Y.; Chen, C. and Wang, J.(2004). Effect of irrigation method and N-fertilizer management on rice yield, water productivity and nutrient-use efficiencies in typical lowland rice conditions in China. *Paddy Water Environ.*, 2: 195-206.
- [20] Sendecor, G.W. and Cochran, W.G.(1990). "Statistical Methods" Iowa State Univ., 8<sup>th</sup> Ed. Iowa, USA.
- [21] Ihtisham, M.L; Haq ; Amanuallah Jan.; Muhammed skafi Juhan Bakht; Jan A. and Shafi M. (2000). Fodder yield of sorghum as influenced by different nitrogen levels and time irrigation. *Sarhad J. Agric.* 16, 253.
- [22] Patel, S.L; Rao, M.S.; Nalatwadmath, S., K. and Reddy, K.K (1999). Response of rabio sorghum to moisture, plant population and nitrogen levels and its residual effect on Bengalgrona growth and yield in the vertisalo plateau of decon plateau. *Advances in Agric. Res.*, India 12, 17.
- [23] El-Batanony, K.M.; Hussein, M.M. and Abo El-Khier, M.S. (1988).Response of *Zea mays* to temporal variation of irrigation and salinity under farm condition in the Nile Delta. *Intr. Conf. Plant growth drought and salinity in the Arab Region.* Dec. 3-7, 1988, Cairo.
- [24] Ghaleb, A.A. (2001). Comparison of water use efficiency for major forag crops grown in Yaman. *Alex. Sci. Exch.*, 22(4): 3763- 3788.
- [25] Hussein, M.M., Saleh A.L; Abd El-Khader A.A and Abo El-Liell A.A (2002). Irrigation intervals and nitrogen fertilizer and their effects on growth and micronutrients status on fodder sorghum. 18<sup>th</sup> ICID and 53<sup>rd</sup> of IEC Congress, August, Montreal, Canada.
- [26] Hussein, M.M. (2004). Water stress and its effect on growth of cotton plants (Review). *Proc. of the Plenary Meeting, Interregional Co-operative Research Network.* Thessalonike, Greece.
- [27] Hussein, M.M.; Mohamed, S.A. and Taalab, A.S. (2006). Influence of drought and foliar application on nutrients status in shoots of barley plants. *Egypt. J. Agron.*, 28(1): 35-46.
- [28] Ashraf, M. (2010). Inducing drought tolerance in plants: Recent advances *Biotechnology Advances*, Volume 28, Issue 1: 169-183.
- [29] Qureshi, R.H. and Barerett-Lennert, E.G. (1998). *Saline Agriculture for Irrigated Land in Pakstan. A Handbook*, Australian Centre for International Agricultural research, Canberra, Australia,pp. 142.
- [30] Saquib, M.; akhtar, J.; and Qureshi, R.H. (2004). Pot study on wheat growth in saline and waterlogged compacted soil. II- Root growth and leaf ionic relations. *Soil & Tillage Res.*, 77: 179-187.
- [31] Bleder, F.; Spiertiz, J.H.; Bouman, B.A.; Lu, G. and Tuong, T.P. (2004). Nitrogen economy and water productivity of lowland rice under water-saving irrigation. *Field Crop Res.*, 93(2-3): 169-85.
- [32] Marsalis, M.A.; Angadi, S.V. and Contreras-Govea, F.E. (2010). Dry matter yield and nutritive value of corn, forage sorghum, and BMR forage. *Field Crops Research*, 116, Issues 1-2: 52-57.
- [33] Banedjschafie, S.; Bastani, S.; Widmoser, P. and Mengel, K. (2007). Improvement of water use and N fertilizer efficiency by subsoil irrigation of winter wheat. *European Journal of Agronomy*, In Press, Corrected Proof, Available online 31 May, 2007.
- [34] Sabbour.M.M.and M. H. Abbass, 2006. The role of some bioagent mixed with some fertilizers for the control of onion pests. *pak. J. Appl. Sci.*2(9): 624-628.
- [35] Sabbour, M. M. and A. F. Sahab 2007. Efficacy of some microbial control agents against *Agrotis ipsilon* and *Heliothis armigera* in Egypt . *Bull. N. R. C. Egypt.* 32: 561-571.
- [36] Sabbour, M. M.2007b. Effect of some natural bioagents and natural enemies against aphids in wheat fields *J. Boil. Pest. Cont* 33: 33-39.
- [37] Sahab, A .F and Sabbour, M.M, (2011). Virulence of four entomopathogenic fungi on some cotton pests with especial reference to impact of some pesticides, nutritional and environmental factors on fungal growth. *Egypt. J. biol pest cont.* 21 (1): 61-67.
- [38] Sabbour, M.M., M. Ragei and A. Abd-El Rahman, 2011. Effect of Some Ecological Factors on The Growth of *Beauveria bassiana* and *Paecilomyces fumosoroseus* Against Corn Borers. *Australian Journal of Basic and Applied Sciences*, 5(11): 228-235, 2011.
- [39] Sabbour, M.M. (2012). Evaluations of some bioagents against the rice weevil *Sitophilus oryzae* under laboratory and store conditions. *Integrated Protection of Stored Products. IOBC-WPRS Bulletin Vol. 81, pp. 135-142.*
- [40] Wojtasik, D. (2004). Effect of irrigation and mineral fertilization on the yield of brewing and fodder cultivars of spring barley. *Acta Agronomica*, 3(2): 119-129.
- [41] Krantze, A. (1997). Yield and grain quality of winter wheat grown under ecological conditions and with intense mineral fertilizer application. *Zeszyty Problemowe Postepow Nuak Rdnicznych*, 439: 201 – 204.
- [42] Patel, S.L. and Sheelavantar, M.N. (2006). Soil water conservation and yield of winter sorghum (*Sorghum bicolor* L. Moench) as influenced by tillage, organic materials and nitrogen fertilizer in semi-arid tropical India. *Soil and Tillage Res.* 9, Issue 2:246-257.
- [43] Gheysari, M.; Mirlatifi, S.M.; Bannayan, M.; Homae,

M. and Hoogenboom, G. (2000). Interaction of water and nitrogen on maize grown for silage Agricultural Water Management, Volume 96, Issue 5, May 2009, Pages 809-821.

[44]Mastrorilli, M.; Katerji, N. and Rana, G. (1999). Productivity and water use efficiency of sweet sorghum as affected by soil water deficit occurring at different vegetative growth stages. European Journal of Agronomy, 11, Issues 3-4: 207-215.

[45]Bluemling, B.; Yang, H. and Westl, C.P. (2007). Making water productivity operational-A concept of agricultural water productivity exemplified at a wheat-maize cropping pattern in the North China Plan. Agric. Water Manag., 91: 11-23.

[46]Dawson, J.C.; Huggins, D.R. and Jones, S.S. (2008). Characterizing nitrogen use efficiency in natural and agricultural ecosystems to improve the performance of cereal crops in low-input and organic agricultural systems. Field Crops Research, 107, Issue 2: 89-101.

[47]Deab, G.M. (1998).Physiological and morphological studies on some sorghum Cultivars growing under saline and sandy soils conditions. Ph.D.Thesis, Fac. of Agric., Cairo Univ., Cairo, Egypt.pp221.

[48]Hussein, M.M. and Aliva, A.K. (2014). Growth, yield and water use efficiency of forage sorghum as affected by NPK fertilizer and deficit irrigation. American J. of Plant Science, 2014, 5:

[49]Mehane, H.M.; Hussein, M.M. and Gafaar, N.A. (2013).Using growth regulators for improving water use efficiency of canola under water deficit. Middle East J. of Appl. Sci., 3(4):161-168.

[50]Saeed, I.A. and El-Nadi, A.H. (1998).Forage sorghum yield and water use efficiency under variable irrigation. Irrigation 18, (2): 81-85.

**Table 1:** Yield of forage sorghum as affected by irrigation intervals

Irrigation intervals day	Fresh matter yield (FMY), t/fed						Dry matter yield (DMY), ton/fed.					
	1 <sup>st</sup> cut		2 <sup>nd</sup> cut		Total		1 <sup>st</sup> cut		2 <sup>nd</sup> cut		Total	
	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s
7	3.27	7.60	9.36	7.35	13.08	14.96	0.356	3.386	1.409	1.896	1.825	5.282
10	3.98	7.56	8.89	7.35	12.87	14.91	0.332	2.953	1.299	1.805	1.628	4.575
13	3.77	6.77	8.35	7.19	12.27	13.45	0.355	2.556	1.075	1.699	1.430	4.226
16	3.65	7.98	8.38	7.89	12.04	15.85	0.471	3.697	0.934	1.673	1.405	5.470
LSDat5%	0.18	N.S.	0.075	N.S.	0.246	1.25	0.03	0.271	0.075	0.133	0.354	0.225

**Table 2:** Yield of forage sorghum as affected by nitrogen fertilizer

Nitrogen fertilizer kg/fed	Fresh matter yield (FMY), t/fed						Dry matter yield (DMY), ton/fed.					
	1 <sup>st</sup> cut		2 <sup>nd</sup> cut		Total		1 <sup>st</sup> cut		2 <sup>nd</sup> cut		Total	
	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s
0	3.45	5.98	7.62	6.36	11.07	17.05	0.367	2.440	1.336	1.488	1.703	3.888
20	3.55	6.27	8.52	7.17	12.07	13.44	0.388	2.647	1.035	1.707	1.423	4.354
40	3.74	7.37	8.91	7.52	12.65	14.89	0.403	3.086	1.198	1.649	1.601	4.735
60	3.98	8.37	9.26	7.99	13.24	16.36	0.409	3.466	1.188	1.832	1.597	2.785
80	4.18	9.67	9.67	8.16	13.85	17.87	0.409	4.101	1.142	2.175	1.551	2.693
LSD at 5 %	0.029	0.720	0.674	0.360	0.385	0.290	0.015	0.47	0.041	0.233	0.360	0.379

**Table 3:** Effect of nitrogen fertilizer and irrigation intervals on yield of forage sorghum

Irrigation intervals Day	Nitrogen fertilizer kg/fed	Fresh matter yield (FMY), t/fed						Dry matter yield (DMY), ton/fed.					
		1 <sup>st</sup> cut		2 <sup>nd</sup> cut		Total		1 <sup>st</sup> cut		2 <sup>nd</sup> cut		Total	
		1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s
7	0	3.30	6.15	7.78	5.90	11.08	12.05	0.408	2.469	2.005	1.329	2.413	3.798
	20	3.52	7.00	8.93	7.17	12.45	14.17	0.031	2.557	1.084	1.784	1.415	4.341
	40	3.74	7.56	9.48	7.27	13.22	14.83	0.396	3.381	1.314	1.671	1.710	5.052
	60	3.88	7.75	9.98	8.13	13.87	15.88	0.489	3.672	1.198	2.272	1.687	5.944
	80	4.16	9.58	10.63	8.30	14.78	17.86	0.454	4.852	1.448	2.424	1.899	7.276
10	0	3.63	5.92	7.93	6.37	11.56	12.29	0.399	2.47	1.281	1.558	1.626	4.028
	20	3.63	6.27	8.68	7.10	12.31	13.37	0.335	2.751	1.227	1.6511	1.562	4.402
	40	3.87	7.03	8.95	7.43	12.82	14.46	0.319	2.679	1.326	1.695	1.645	4.274
	60	4.36	9.03	9.18	7.83	13.54	16.86	0.301	3.209	1.422	1.777	1.723	4.981
	80	4.39	9.56	9.75	8.03	14.14	17.59	0.304	3.655	1.242	2.444	1.582	6.099
13	0	3.44	5.22	7.33	5.97	10.77	11.19	0.198	1.563	1.145	1.316	1.341	2.857
	20	3.47	5.65	8.43	6.83	11.80	12.41	0.393	2.041	1.009	1.718	1.402	3.759
	40	3.88	6.47	8.75	7.37	12.43	13.84	0.382	2.612	1.217	1.507	1.599	4.119
	60	3.98	7.68	8.95	7.77	12.93	15.45	0.362	2.739	1.087	1.810	1.452	4.429
	80	4.27	8.88	9.20	8.00	13.44	16.88	0.440	3.826	0.918	2.142	1.358	5.968
16	0	3.41	6.83	7.40	7.20	10.84	13.83	0.464	3.258	0.912	1.588	1.376	4.846
	20	3.58	6.22	8.05	7.57	11.63	13.79	0.491	3.239	0.819	1.674	1.310	4.913
	40	3.67	8.40	8.45	8.00	12.12	16.40	0.513	3.672	0.935	1.823	1.448	5.795
	60	3.70	9.03	8.93	8.23	12.63	17.26	0.479	4.247	1.043	1.587	1.522	5.834
	80	3.90	9.64	9.08	8.33	12.98	17.97	0.408	4.071	0.963	1.691	1.371	5.962
SD at 5 % level			0.06	N.S	N.S	N.S	0.719	N.S	0.030	0.940	0.082	0.570	0.719

**Table 4:** Effect of nitrogen fertilizer and irrigation intervals on water use efficiency of sorghum plants

Irrigation intervals day	Water Use Efficiency (Kg/M3.)	Water Use Efficiency (Kg/M3.)					
		1 <sup>st</sup> cut		2 <sup>nd</sup> cut		Mean	
		2 <sup>nd</sup> s	1 <sup>st</sup> s.	2 <sup>nd</sup> s	1 <sup>st</sup> s	2 <sup>nd</sup> s.	1 <sup>st</sup> s
7	0	3.64	2.87	0.58	0.90	2.11	1.89
	20	2.97	3.34	0.39	1.03	1.68	2.19
	40	3.17	3.53	0.41	0.35	1.79	1.94
	60	3.30	4.02	0.40	1.42	1.85	2.72
	80	3.52	4.25	0.45	1.76	1.99	3.01
	Mean	3.32	3.60	0.44	1.09	1.88	2.35
10	0	3.51	3.76	0.49	1.22	2.00	2.49
	20	3.37	4.05	0.47	1.33	1.92	2.69
	40	3.89	4.38	0.50	1.33	2.19	2.66
	60	4.10	5.11	0.52	1.51	2.31	3.31
	80	4.29	5.36	0.51	1.85	2.40	3.61
	Mean	3.83	4.53	0.50	1.45	2.17	2.99
13	0	3.99	4.14	0.50	1.06	2.25	2.60
	20	4.37	4.60	0.52	1.39	2.45	3.00
	40	4.60	5.13	0.59	1.53	2.60	3.33
	60	4.79	5.72	0.54	1.64	2.67	3.68
	80	4.98	6.25	0.50	2.58	2.74	4.42
	Mean	4.55	5.17	0.53	1.64	2.54	3.41
16	0	4.52	5.76	0.57	2.02	2.55	3.89
	20	4.82	5.75	0.55	2.05	2.67	3.90
	40	5.05	6.87	0.60	2.83	2.83	4.85
	60	5.26	7.19	0.63	2.85	2.95	5.02
	80	5.41	7.49	0.57	2.49	2.99	4.99
	Mean	5.01	6.61	0.58	2.45	2.78	4.53
Mean values of nitrogen fertilizer	0	3.92	4.13	0.54	1.30	2.23	2.72
	20	3.88	4.44	0.48	1.45	2.18	2.95
	40	4.18	4.72	0.52	1.51	2.35	3.12
	60	4.36	5.51	0.52	1.86	2.44	3.69
	80	4.55	5.84	0.51	2.92	2.53	4.38

