seems to be one of the most important phenomenon in the physiology of irradiated crop plants. The respiratory increase in the irradiated plants due to (1) uncoupling of oxidative phosphorylation and (ii) synthetic process stimulated. In these instances the consumption of ATP lead in synthetic processes and the resultant increase in ADP lead to the higher rate of respiration. The rate of respiration was more in parents as compared to F_1 hybrid.

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EFFECT OF SURGE IRRIGATION ON YIELD ATTRIBUTES, YIELD AND ECONOMICS OF SUNFLOWER (CO-2)

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ABSTRACT

Experiments were conducted at Tamil Nadu Agricultural University, Coimbatore to study the effect of surge irrigation on yield attributes, yield and economics of sunflower (Co-2) in summer and monsoon seasons of 1996. The crop was grown in double row planting. No significant difference was observed between surge and continuous irrigation. Considering amendments, coconut fibre waste application (with additional dose of NPK) significantly increased yield attributes and yield as compared to FYM application. Among the sectors, sector I recorded higher values which was comparable with Sector II and IV. Sector III significantly different from other sectors in first crop. In second crop Sector-I was comparable with sector II and IV and again Sector IV was comparable with sector III. The higher net returns with high benefit cost ratio was observed in surge irrigation as compared to continuous irrigation. Also coconut fibre waste applied plots recorded increased yield.

KEY WORDS : Surge irrigation, sunflower, yield attributes, yield, economics

INTRODUCTION

Sunflower is an important vegetable oil source noted for its poly unsaturated fattyacids. Irrigation is the single largest factor contributing to the success of sunflower crop.

Among the surface irrigation methods surge irrigation is the possible alternative for basin furrow due to its effectiveness in land use through lengthy furrow, delivery of water into the furrow, water economy and reduced labour requirement for irrigation. Ease of operation for the worker through reducing the burden of irrigation work yet another advantage. There is also scope to reduce the cost of operation after formation of ridges.

Surge irrigation is the delivery of water into the furrow in an ON/OFF fashion relatively over the short span of time and involving lesser opportunity time for water front advance due to the formation of surface sealing after displacement, migration and reorientation of clay particles.

MATERIALS AND METHODS

The experiments were conducted at Tamil Nadu Agricultural University, Coimbatore during summer and monsoon season of 1996 to study the effect of surge irrigation in 100 m furrows with a surge cycle ratio of 0.5 (10 minutes ON and 10 minutes OFF timings) in sunflower Co-2.

Sunflower seeds was sown on both sides of the ridge on double row planting without altering the inter row spacing.

The inlet pipes of 50 cm length with diameters of 7.0 cm were provided at the head with stopper for easy operation (Rajagopal 1992). The inlet pipes were made of waste aluminium sheets which were used in the Off-set printing machines by stapling at the end. During Off time the inlet pipes were closed by using polythene bag tied with rubber band. The parshall flume was fitted to measure the quantity of water that flows to feeding channel. The flow rate was fixed as 1 lps. The irrigation was scheduled at IW/CPE = 0.75 ratio adopting an irrigation depth of 50 mm for farmer's practice and for other irrigation treatments it was theoretically 50 mm but it was actually varying depending upon the treatment.

Treatment includes

1. Surge flow with coconut fibre waste application - $I_1A_1S_1$

   @ 12.5 t ha^{-1} + 125% NPK (0-25 m) Sector I

2. Surge flow with coconut fibre waste application - $I_1A_1S_2$

   @ 12.5 t ha^{-1} + 125% NPK (26-50 m) Sector II

3. Surge flow with coconut fibre waste application - $I_1A_1S_3$

   @ 12.5 t ha^{-1} + 125% NPK (51-75 m) Sector III

4. Surge flow with coconut fibre waste application - $I_1A_1S_4$

   @ 12.5 t ha^{-1} + 125% NPK (76-100 m) Sector IV

5. Surge flow with FYM application @ 12.5 t ha^{-1} + - $I_1A_2S_1$

   100% NPK (0-25 m) Sector I

6. Surge flow with FYM application @ 12.5 t ha^{-1} + - $I_1A_2S_2$

   100% NPK (26-50 m) Sector II

7. Surge flow with FYM application @ 12.5 t ha^{-1} + - $I_1A_2S_3$

   100% NPK (51-75 m) Sector III

8. Surge flow with FYM application @ 12.5 t ha^{-1} + - $I_1A_2S_4$

   100 NPK (76-100 m) Sector IV

9. Continuous flow with coconut fibre waste application - $I_2A_1S_1$

   @ 12.5 t ha^{-1} + 125% NPK (0-25 m) Sector I

10. Continuous flow with coconut fibre waste application - $I_2A_1S_2$

    @ 12.5 t ha^{-1} + 125% NPK (26-50 m) Sector II

11. Continuous flow with coconut fibre waste application - $I_2A_1S_3$

    @ 12.5 t ha^{-1} + 125% NPK (51-75 m) Sector III

12. Continuous flow with coconut fibre waste application - $I_2A_1S_4$

    @ 12.5 t ha^{-1} + 125% NPK (76-100 m) Sector IV

13. Continuous flow with FYM application @ 12.5 t ha^{-1} + - $I_2A_2S_1$

    100% NPK (0-25 m) Sector I

14. Continuous flow with FYM application @ 12.5 t ha^{-1} + - $I_2A_2S_2$

    100% NPK (26-50 m) Sector - II

15. Continuous flow with FYM application @ 12.5 t ha^{-1} + - $I_2A_2S_3$

    100% NPK (51-75 m) Sector - III

16. Continuous flow with FYM application @ 12.5 t ha^{-1} + - $I_2A_2S_4$

    100% NPK (76-100 m) Sector - IV

17. Farmer's practice

    Basin furrow irrigation was done with a depth of 5.0 cm

The experiments were laidout in a factorial randomized block design replicated thrice.

RESULTS AND DISCUSSION

i. Yield attributes :

The values for yield attributes namely head diameter, number of filled grains head^{-1} and hundred grain weight were higher during monsoon season than summer season. This may be due to favourable climate condition enjoyed during the monsoon season.

Irrigation methods namely surge and continuous irrigation did not influence the yield attributes significantly. Considering amendments, coconut fibre waste application significantly increase yield attributes as compared to FYM application. This might be due to improved physico-chemical properties of soil. This result was in conformity with Krishnakumar (1994).

Among the sector, the Sector I, II and IV were comparable to each other. A similar trend of results was also reported by Dhanapal (1996) in Maize. In the second crop the Sector III was comparable to Sector IV. All the interactions were non significant.

When comparing farmer practice with I_1 A_1 S_1 farmers practice recorded lower values for these characters. This might be due to unfavourable moisture situation as compared to surge irrigation. On comparing the farmer's practice with I_1 A_2 S_1 (surge with FYM under Sector-I) they were not significantly differing from each other. In the second crop farmer's practice was on par with I_1 A_1 S_1 (surge irrigation with coconut fibre along with 125% NPK under Sector I).

ii. Grain and stover yield

The grain and stover yield were higher during monsoon seasons than summer season. This may be attributed to the favourable climate condition like temperature, rainfall and other climatic factors during crop growth period in monsoon season.

Considering amendments, coconut fibre waste with 125% NPK significantly increased the grain yield and stover yield as compared to FYM application. It is attributed to favourable physico-chemical condition created by coconut fibre waste application. Improved hydraulic conductivity and bulk density might have resulted in loose and friable soil condition. This might have contributed to better root growth and uptake of nutrients and high available soil moisture

Table 1. Effect of surge irrigation on yield attributes of sunflower

Treatments	First crop			Second crop		
	Head diameter (cm)	No. of filled grains head^{-1}	Hundred grain weight (g)	Head diameter (cm)	No.of filled grains head^{-1}	Hundred grain weight (g)
I_1	12.96	560	4.13	14.27	621	4.25
I_2	13.07	555	4.14	14.27	623	4.25
SE_D	0.100	4.0	0.033	0.098	4.458	0.035
CD (P=0.05)	NS	NS	NS	NS	NS	NS
A_1	13.30	573	4.19	14.54	636	4.32
A_2	12.83	539	4.09	14.01	608	4.18
SE_D	0.100	4.0	0.033	0.098	4.458	0.035
CD (P=0.05)	0.205	8.1	0.068	0.199	9.081	0.072
S_1	13.40	571	4.20	14.48	631	4.29
S_2	13.36	568	4.17	14.40	629	4.27
S_3	12.26	517	4.20	13.99	608	4.20
S_4	13.23	562	4.16	14.21	620	4.24
SE_D	0.142	5.6	0.047	0.138	6.305	0.048
CD (P=0.05)	0.289	11.4	0.096	0.282	12.842	0.098
Farmer's practice	12.99	535	4.11	14.45	627	4.22
SE_D	0.283	11.21	0.069	0.277	12.61	0.070
CD (P=0.05)	0.580	22.93	0.140	0.567	25.80	0.143

Table 2. Effect of surge irrigation on yield attributes of sunflower

Treatments	First crop		Second crop	
	Grain yield (kg/ha)	Stover yield (kg/ha)	Grain yield (kg/ha)	Stover yield (kg/ha)
I_1	1294	4022	1434	4507
I_2	1289	3958	1449	4535
SE_D	9.51	41.4	10.76	45.54
CD (P=0.05)	NS	NS	NS	NS
A_1	1328	4120	1469	4716
A_2	1255	3835	1423	4416
SE_D	9.51	41.4	10.76	45.54
CD (P=0.05)	19.37	84.71	21.91	93.18
S_1	1332	4219	1468	4694
S_2	1322	4190	1458	4677
S_3	1199	3793	1421	4498
S_4	1313	4102	1438	4616
SE_D	13.45	57.32	15.21	63.45
CD (P=0.05)	27.39	117.30	30.99	129.83
Farmer's practice	1270	3783	1465	4671
SE_D	26.39	116.25	30.43	132.50
CD (P=0.05)	55.03	237.87	62.26	271.12

maintained during crop growth. Similar findings was also reported by Durai (1982), Sunder Singh (1989), Vijayalakshmi (1991).

Among the sectors, Sector I, II and IV were comparable to each other. Sector III recorded significantly lesser grain and stover yield when compared to other sectors. In the second crop Sector I, II, IV were on par. Sector III was comparable to Sector IV. For grain yield eventhough it was statistically significant the yield reduction under Sector III was only 2 per cent when compared to Sector I. It is attributed to relatively lesser infiltration opportunity time (IOT), and reduced water intake. In the first two sectors, water infiltration increased due to increased opportunity time (IOT), while in the last sector, the stagnant water might have contributed to higher infiltration time. In the second crop, this effect was mitigated to some extent by intermittant rainfall received during crop growth period. A similar trend was also reported by Rajagopal and Dhanapal (1994) in sunflower and Dhanapal (1996) in maize. The interaction effects among the treatments were not significant. On comparing farmers practice with I_1 A_1 S_1 farmers practice differed significantly with lesser grain yield. On comparing with I_1 A_2 S_1 farmers practice was not differed significantly. The reason might be due to loss of plant population in equalizer of the basin furrow. Also relatively higher quantum of water was applied to the farmers

Table 3. Effect of surge irrigation on economics of sunflower

Treatment	First crop					Second crop				
	Cost of irrigation (Rs.)	Cost of cultivation (Rs./ha)	Gross return	Net Return	B:C ratio	Cost of irrigation (Rs.)	Cost of cultivation (Rs./ha)	Gross return	Net Return	B:C ratio
$I_1A_1S_1$	821	7094	14353	7259	2.02	751	7044	15417	8313	2.19
S_2	821	7094	14198	7101	2.00	751	7044	15335	8291	2.18
S_3	821	7094	12839	5745	1.81	751	7044	14863	7819	2.11
S_4	821	7094	14035	6941	1.98	751	7044	14897	7853	2.11
$I_1A_2S_1$	763	7633	13405	5871	1.77	620	7490	14877	8012	1.99
S_2	763	7633	13405	5772	1.76	620	7490	14815	7950	1.98
S_3	763	7633	11971	4338	1.57	620	7490	14816	7321	1.89
S_4	763	7633	13249	5616	1.74	620	7490	14627	7762	1.95
$I_2A_1S_1$	1091	7384	14195	6562	1.92	977	7270	15436	8166	2.13
S_2	1091	7384	14087	6454	1.91	977	7270	15405	8135	2.12
S_3	1091	7384	12633	5000	1.71	977	7270	14965	7695	2.06
S_4	1091	7384	14093	6460	1.91	977	7270	15207	7937	2.09
$I_2A_2S_1$	863	7733	13348	5615	1.73	834	7704	15046	7967	1.95
S_2	863	7733	13248	5575	1.71	834	7704	14976	7867	1.94
S_3	863	7733	12281	4548	1.59	834	7704	14724	7645	1.91
S_4	863	7733	13090	5357	1.69	834	7704	14776	7697	1.92
Farmer's practice	1351	8221	13140	5567	1.59	1278	7573	15224	7651	2.01

practice in the early stage. Land saving under surge irrigation is yet another factor responsible for higher yield. In the second crop the farmers practice was comparable with I_1 A_1 S_1.

iii. Economics

The higher net returns with higher benefit cost ratio was recorded under coconut fibre waste applied plots than the FYM applied treatment. Between the methods of irrigation, surge flow recorded a higher net returns and higher benefit cost ratio as compared to farmers practice. This may be attributed to higher grain number combined with other favourable yield attributes. The lowest net returns and benefit cost ratio were recorded under farmer's practice. Among the Sectors, Sector I recorded higher net returns with greater benefit cost ratio and gradually decreased upto Sector III and again increased in Sector IV. This might be due to higher yields obtained in these sectors as compared to Sector III. Considering the three sectors namely S_1, S_2, S_4 were free from 'Middle depression' which was recorded in Sector III. The middle depression has to be overcome especially in summer season by suitable device to make the surge irrigation feasible for a length of 100 m and above.

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EFFECT OF ORGANIC, INORGANIC SOURCES OF NITROGEN AND MOLYBDENUM ON THE QUALITY OF BAJRA-NAPIER HYBRID GRASS (CO 2)

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ABSTRACT

Field experiment was conducted at the Tamilnadu Agricultural University, Coimbatore to study the effect of organic (FYM) and inorganic sources (Urea, CAN) of nitrogen with and without molybdenum on the quality characters of CO.2 Bajra Napier hybrid grass under irrigated condition. The results indicated that application of 75 kg N ha^{-1} in the from of urea with 2.5 t of FYM ha^{-1} recorded higher crude fibre, crude fat and total ash content than the other treatments. The interaction effect did not influence the crude fibre, crude fat and the total ash content.

KEY WORDS : Bajra-Napier, Molybdenum, Nitrogen, Calcium Ammonium Nitrate (CAN), Urea, FYM

Livestock is an insurance in the changing pattern of rural economy which is significantly influenced due to the vagaries of nature. Livestock industry is providing uniform employment opportunity round the year and enhances per capita income. The efficiency with which the ruminants