EVALUATION OF IRRIGATION SCHEDULE AND TIME OF SOWING FOR MAIZE, BASED ON ECONOMIC INDICES

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ABSTRACT

Economic indices were computed from the experimental data obtained from the investigations carried out at Tamil Nadu Agricultural University, Coimbatore during summer and Kharif seasons of 1984 and 1985 in order to find out the influence of agromet factors and irrigation scheduling on the performance of COH 1 maize. The crop supplied with adequate moisture throughout the crop period recorded higher gross and net returns, benefit cost ratio and per day gross return which declined progressively with the level of moisture stress experienced during various growth stages irrespective of the season. Higher values of these indices were registered when the maize crop was sown on December 1 during summer and August during Kharif seasons.

Maize is gaining ground even in places where it has not been grown earlier. Being a fairly high remunerative crop with relatively higher fodder and feed value, maize is finding just place in the cropping patterns. It posses greater yield potential and performs better in all the seasons. The possibility of water economy in growing maize crop by withholding irrigation during the growth stages which are less sensitive to moisture stress needs elucidation especially to keep place the progressive shrinking water availability for irrigation. Skipping irrigation during less critical stages did not alter the net income, while the same was affected due to stress at tasseling and silking (Thiyagarajan, 1981). Identification of optimum time of sowing for a crop ensures higher production and economical returns. Tice and Clouser (1982) opined that weather could increase the net farm income by 9-14 per cent. Attempts were made to find out the optimum time of sowing and economic quantity of irrigation water for maize grown in different seasons by evaluating different economics indices.

MATERIALS AND METHODS

Investigations were carried out to study the economics of maize sown on different dates during summer and kharif under varied moisture regimes at, Tamil Nadu Agricultural University, Coimbatore. Three irrigation schedules viz., higher (8 irrigations) moderate (6 irrigations) and lower (5 irrigations) and six times of sowing at fortnightly intervals (December 1 to February 16 during summer and June 1 to August 16 during kharif) were tested in a split-plot design replicated thrice assigning irrigation schedules to main plots and times of sowing to sub-plots with COH 1 as test

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genotype in summer and kharif seasons of 1984 and 1985. Water to a depth of 5 cm was provided at each irrigation. Four economic indices viz., gross returns, net returns, benefit-cost ratio and per day gross return were computed based on the yield of crop under various treatments and cost involved in imparting the corresponding treatments.

RESULTS AND DISCUSSION

The data on computed economic indices and yield of maize is presented in tables 1 to 3, seasonwise.

GRAIN AND STOVER YIELD

The grain and stover yield were higher during kharif than during summer. Moisture availability and variation in agromet factors by regulation of sowing dates influenced both grain and stover yield in all the seasons under study. Grain and stover production were higher when the crop was supplied with adequate moisture throughout the growing period and gradual reduction was noticed with imposition of mild and moderate moisture stress by skipping irrigations at two and three growth stages which are less sensitive to moisture stress respectively. This indicates that moisture supply has a direct bearing on the production of ultimate grain and stover. Early sowing (December 1) during summer and delayed sowing (August) during kharif favourably influenced the grain and stover yield. Both the yields were lowest by delaying the sowing in summer and advancing the same in kharif.

GROSS AND NET RETURNS

Gross and net returns were higher during kharif than during summer. Moisture regimes as well as sowing dates altered the gross and net returns in all the seasons of the study.

Gross and net returns were highest when moisture supply was adequate throughout the crop growth and the same were reduced by moisture stress during two or three phenophases. The extent of reduction of both the indices were marginal in the crop with 6 irrigations and drastic with 5 irrigations irrespective of the season.

Highest gross and net returns associated with adequate moisture regime are invariably due to higher grain and stover yields obtained under the said situations. The declinining trend of returns with reduced supply of water has obviously followed the trend of grain and stover yields. This is in confirmation with the findings of Ramanisankar (1979) and Thiyagarajan (1981).

Gross and net returns were altered by sowing dates markedly during summer and marginally during kharif since the cost of cultivation is same for the crop sown on different dates in summer, the gross and net returns follow the same pattern. The above said situation, however, occurred only for the first three sowing dates of kharif, while the cost of cultivation was slightly lesser for the later three sowing dates because of saving in supply of irrigation water to that extent contributed by the seasonal effective rainfall in both the years. Gross

TABLE 1 : Effect of irrigation schedule and time of sowing on yield and economics of maize summer, 1984.

Treatments	Grain yield (kg ha^{-1})	Stover yield (kg ha^{-1})	Gross return (Rs. ha^{-1})	Cost of cultivation (Rs. ha^{-1})	Net return (Rs. ha^{-1})	B.C. ratio	Per day gross return (Rs. ha^{-1} day^{-1})
Irrigation Schedule							
I$_1$	5047	7616	9693	4138	5555	2.33	95
I$_2$	4608	6876	8843	3978	4865	2.22	86
I$_3$	3828	6006	7371	3898	3473	1.88	72
Sowing Dates							
D$_1$	5831	8370	11165	4004	7161	2.78	105
D$_2$	5448	7675	10419	4004	6415	2.59	100
D$_3$	5238	7537	10030	4004	6026	2.50	98
D$_4$	4585	6847	8800	4004	4796	2.19	87
D$_5$	3389	6050	6584	4004	2579	1.63	66
D$_6$	2475	4519	4815	4004	810	1.19	50

Cost of irrigation Rs. 80 irrigation^{-1}.

Cost of grain Rs. 1700/t Cost of stover Rs. 150/t.

TABLE 2 : Effect of irrigation schedule and time of sowing on the yield and economic of maize - kharif, 1984.

Treatments	Grain yield (kg ha⁻¹)	Stover yield (kg ha⁻¹)	Gross return (Rs. ha⁻¹)	Cost of cultivation (Rs. ha⁻¹)	Net return (Rs. ha⁻¹)	B.C. ratio	Per day gross return (Rs. ha⁻¹ day⁻¹)
Irrigation Schedule							
I_1	5976	7711	11048	4084	6963	2.70	103
I_2	5148	7272	9846	3951	5895	2.48	91
I_3	4374	6648	8403	3871	4532	2.16	78
Sowing dates							
D_1	5271	7557	10091	4004	6087	2.49	91
D_2	4311	6182	8253	4004	4248	2.05	76
D_3	4529	6399	8664	4004	4659	2.15	81
D_4	5153	7207	9851	3924	5926	2.50	93
D_5	5599	7889	10708	3978	6730	2.68	101
D_6	5771	8029	11029	3898	7131	2.82	104

Cost of irrigation Rs. 80 irrigation⁻¹, Cost of grain Rs. 1700/t,
Cost of stover Rs. 150/t.

TABLE 3 : Effect of irrigation schedule and time of sowing on the yield and economics of maize - kharif, 1985.

Treatments	Grain yield (kg ha^{-1})	Stover yield (kg ha^{-1})	Gross return (Rs. ha^{-1})	Cost of cultivation (Rs. ha^{-1})	Net return (Rs. ha^{-1})	B.C. ratio	Per day gross return (Rs. ha^{-1} day^{-1})
Irrigation Schedule							
I$_1$	6096	7762	11593	4084	7508	2.83	109
I$_2$	5409	7347	10322	3924	6398	2.63	97
I$_3$	4575	6823	8779	3844	4934	2.28	82
Sowing dates							
D$_1$	5503	7447	10499	4004	6495	2.61	95
D$_2$	4657	6882	8933	4004	4928	2.21	83
D$_3$	4815	6986	9225	4004	5220	2.29	86
D$_4$	5285	7187	10087	3924	6163	2.56	96
D$_5$	5923	7619	11270	3924	7345	2.86	108
D$_6$	5976	7743	11375	3844	7530	2.94	109

Cost of irrigation Rs. 80 irrigation^{-1}

Cost of grain Rs. 1700/t

Cost of stover Rs. 150/t

and net returns were highest with the crop sown on December 1 and declined progressively with delay in sowings during summer, particularly the reduction in the returns was drastic and incurred loss when the sowing time is delayed beyond January. Higher returns were recorded with the crops sown in August during both the **kharif** seasons. As regards sowing time the trend of returns confers to that of marketable grain and stover. Change in sowing time could alter the income as reported by Tice and Clouser (1982).

BENEFIT-COST RATIO AND PER DAY GROSS RETURN

In general, benefit-cost ratio and per day gross return were more during **kharif** than summer. Moisture regimes as well as sowing time altered the benefit-cost ratio and per day gross returns in all the seasons of the study.

Benefit-cost ratio was highest when the crop was supplied with adequate moisture throughout the crop period and declined progressively with the level of moisture stress experienced during various growth stages irrespective of the season. Benefit cost ratio was more with the crop sown on December 1 and declined progressively with delayed sowings during summer. Higher benefit-cost ratio was obtained with the crops sown in August during **kharif**. Variations in per day gross return due to irrigation schedules and sowing time conferred to the same trend that of benefit-cost ratio in all the seasons. Highest benefit-cost ratio and per day gross returns obtained with favourable moisture regimes and sowing time are due to higher gross return associated with the said situation. Irrespective of the season, adequate moisture provision throughout the crop growth period proved to be more economical than the reduced provision of moisture during either two or three phenophases.

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