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YIELD GAP ANALYSIS IN DRYLAND RAGI [*ELEUSINECORACONA* (L.) GAERTN.]

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ABSTRACT

The study evaluates the magnitude of yield gaps in dryland ragi and the contribution of technological physical and economic factors associated with yield gaps, using evperiment–cum–survey technique on thd fields of selectcd farmers. Income levels of ragi crop could be increased by 50% by adopting imporved variety, recommended level of fertiliser application and package of management practices. It was estimated that an income level of Rs. 2,365 with ragi yield of 7.68 q/ha along with intercropping, could be increased to Rs. 3,543 through production of 15 quintals of ragi per hectare by adopting the above three groups of technologies on farmers fields. Improved variety along with fertiliser application contributed 64% of the gap in yield and the package of management practices contributed 36% of the yield gap. The study also identified and estimated the role of some of the physical and economic variables in reducing the yield gaps.

INTRODUCTION

Though considerable progress in research has taken place to evolve new technologies in improving the crop yield in dryland agriculture, the yield levels in farmers fields remain far less than what could have been achieved (Datta *et. al.*, 1978). Studies have shown that, gaps between the potential yield and the actual yield in farmers' fields are substantial and need systematic investigation to understand their magnitude and causes (Rajashekara and Hebbar, 1981). While adoption studies throw light on the reasons for non-adoption of new technologies, they do not answer the questions pertaining to reasons for unattainability of the potential yield by farmers even after the adoption of new technologies. Constraints to achieve these yield potentials may be techonolog'cal economic sociological or their combinations. A preliminary study indicated that, the average yield of dryland ragi in the farmers' field is about 10.6 q/ha and the potential yield estimated through demonstrations on the farmers field is about 15.8 q/ha (Hebbar, 1980). This study has, therefore been taken up to measure the on-farm gap between the potential and the actual yields and to evalute the role of technological, physical and economic factors associated with the yield gaps.

MATERIAL AND METHODS

The study was taken up at Shanuboganahalli under the operational Research Project for Bangalore district, during the

crop year 1981-82. Following three groups of technological factors were identified as test factors : 1. improved variety, 2. recommended dose of fertiliser application and 3. package of management practices consisting of growing ragi as the sole crop, use of seed-cum fertiliser drill and two split doses of nitrogen followed by intercultivation. Growing ragi as a pure crop was included in the package of management practices, because, conventional method of growing fodder jowar (sorghum vulgave Pers.) and field bean *(Dolichos lablab L.)* after every seventh row of ragi is considered as adversely affecting ragi yield.

The experimental technique planned for the study consisted of the following three types of treatments: 1. HM (high management) plots, including the above three groups of technological factors, 2. NM-1 (normal management) plots, consisting of first two technological factors viz., improved variety and recommended dose of fertiliser application with the farmers' package of management practices and 3. NM-2 (normal management) plots froming the control plots with local variety, farmers' leavel of fertiliser application and farmers' package of management was to measure the combined effect of improved variety and fertiliser application, as these are the two dominant technological factors on farmers' fields. Inputs were spplied to HM and NM-1 plots, Supply of inputs to NM-1 plots also removed the credit constraints for farmers, in addition to seperating the effect of two dominant technological factors.

The experiments were laid out in plots of 0.20 ha on the fields of the selected farmers. The sample consisted of 24 farmers under three groups namely A, B, and C. Groups A consisted of all the three plots (HM, NM-1 and NM-2). Group B consisted of only two plots (NM-1 and NM-2) and group C only NM-2 plots. The samples were drawn from different categories of land holdings namely, less than 1 hatare (H_1). 1-2 hectares (H_2) and more than 2 hectares (H_3) and from holdings with (B_1) and without (B_0) bullock pairs (Table 1). Farmers' reactions on technologies concerned, physical and economic constraints coming in the way of adopting technologies, labour utilisation, time and duration of cultivation operation and other observations were recorded from time to time. Grain and the stover yields of the main crop and the intercrops were estimated by harvesting sample plots in treatment and gross income for each plot were computed. Measurement of the yield gaps in this study is through the gaps between the gross income.

RESULTS AND DISCUSSION

The increase in the average gross income in HM plots was 50% and NM 1 plots 32% over the centrol NM-2 plots (Table-2). The income (50%) in the HM plot over the control plot could be attributed to the three groups of technological factors namely: 1. improved variety 2. recommended dose of fertiliser applicaon and 3. package of improved management practices. Higher income (32%) in NM-1 plot over the control (NM-2) plots could be due to the improved variety and

Table 1. Distribution of sample farmers under each group and resource base category.

Resource base category	Group		
	A	B	C
H_1 B_0	3	3	2
H_1 B_1	1	1	1
H_2 B_0	1	1	—
H_2 B_1	5	1	—
H_3 B_0	—	—	—
H_3 B_1	2	—	3
Overall	12	6	6

Table 2. Yield data and gross income under different treatments

Treatments.	Yield of ragi (Kg/ha).	Returns (Rs/ha)		Gross income (Rs/ha).
		ragicrop.	intercrop.	
NM — 2 plots	768	1953	411	2,365 (100.00)
NM — 1 plots	1017	2510	612	3,123 (132.05)
HM — plots	1495	3543	—	3,543 (149.90)

Figures in the parentheses are percentages in relation to those under NM–2 plots

recommended dose of fertiliser application. The balance (18%) of the increased income in the HM plots could be attributed to the package of management practices. Income gaps (representing yield gaps) between different technological combinations are depicted in Fig. 1. Considering Rs. 1178 as the overall income gap between the HM and NM–2 plot, about 64% of the gap (Rs. 758) was due to non-adoption of the improved variety and fertiliser application and 36% of the gap (Rs. 420) was due to nonadoption of the package of management practices.

Mean income levels were higher on bigger farms (Table 3). Income level of H_2 (1 to 2 ha) category was 25% higher than that of H_1 (less than 1 ha) category, Income level of H_3 (more than 2 ha) category was 13% higher than that of H_2 category. The mean income gap between H_2 and H_1 category was Rs. 625 per hectare while between H_3 and H_2 Rs. 230 per hectare. The large holdings have better infrastructure such as improved implements, equipments and the capital required for farming. Smaller holdings lack these infrastructures. Slmilary, income levels were higher on farms with bullock pairs (Table 4) under all the three technological situations and the average increment worked out to be Rs. 683/ ha. Availability of the bullock pairs helps in timely land preparation and sowing, and also increased supply of the farmyard manure (FYM).

Number of ploughing was higher by 7 to 12% and land preparation was spread over for a longer period by 13 to 20% on farms with bullock pairs when compared to farms without bullock pairs. Bullock pair availability affected the timeliness of sowing. Majority of the farmers (78%) with bullock pairs completed their sowing within 3 days of the first soaking rains whereas majority of farmers(58%)without bullock pairs could take up sowing only after 6 days of the soaking rain. None of the farmers without bullock pairs could take up sowing within 3 days of the first soaking rain. Availability of bullocks also facilitated increased (12%) application of the FYM.

The study thus quantifies the potentials of the major technological factors and that of management practices in raising yields of dryland ragi. The study also identifies the ragi yield level as 7.68 q/ha and the intercrop yield worth Rs.411 on the farmers fields. The total income of Rs. 2365 at the above yield level could be increased to Rs. 3543 by producing 15 q/ha ragi with the aid of the three groups of technology. The study also identifies the importance of physical and economic variables which are complementary in improving the crop yields, specially on small holdings. Institutional support for the farmers to overcome these limitations would, therefore, help in reducing yield gaps on the farmers fields.

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Table 3. Gross inccme (Rs/ha) and gaps between different size of holding

Size category	Technological situation			Average
	NM – 2	NM – 1	HM	
H_1	2042	2765	2911	2573
H_2	2503	3214	3877	3198
H_3	2851	3628	3805	3428
Gap between H_1 and H_2	461	449	966	625 (24.29)
Gap between H_2 and H_3	348	414	– 72	230 (13.44)

Figures in the parenthes are percentages

Table 4. Gross income (Rs/ha) on farms with and without bullock pairs.

Resource situation.	Technological Situation			Average
	NM – 2	NM – 1	HM	
Without bullock pair	2023	2673	3076	2591
With bullock pair	2608	3449	3766	3274
Increment	585	776	690	683
	(29.0)	(29.0)	(22.0)	(26.36)

Figures in parentheses are percentage increments over 'without bullock pair' situation.

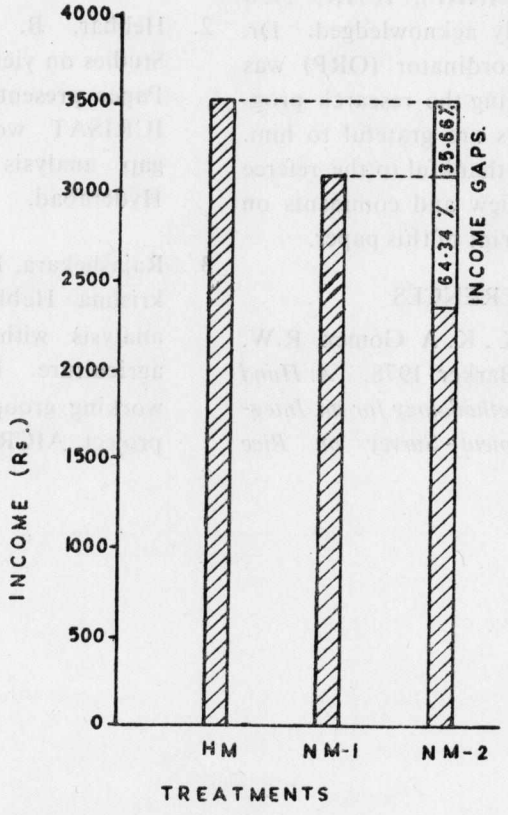

Fig. 1 Income gap between technological combinations

Legend :

H M Plot —Technology (i)+(ii)+(iii)=Improved variety+Fertiliser application+Package of Management Pratices.

N M-1 Plot —Technology (i)+(ii)=Improved variety+Fertiliser application

N M-2 Plot —Control

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