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RESOURCE USE EFFICIENCY IN A DRY FARMING AREA OF BANDA DISTRICT OF UTTAR PRADESH

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The green revolution as visible in part of the country has generated confidence for the attainment of self-sufficiency on the food front in the very near future. With the introduction of High-Yielding Varieties Programme not only the productivity per acre but also the productivity per unit of time could substantially be raised through adherence to multiple cropping programme. However, the most limiting factor which stands in the way of the exploitation of this opportunity on a wider scale is the non-availability of assured irrigation facilities. About 75 per cent of the total cropped area in the country is rain-fed. Also there exists diversity in the magnitude of rainfall from one area to another. This necessitates that proper attention should be given for examining the resource use efficiency of farmers in rain-fed areas. Even in rain-fed areas rainfall distribution is uneven. This requires a study of the agro-economic factors responsible for the poor performance of agriculture in such rain-fed areas for corrective Government measures to ameliorate the farming conditions and to sustain the agricultural growth. This study is an attempt in this direction with special reference to the Banda district of the Bundelkhand region of Uttar Pradesh. The specific objectives of the study are (*i*) to study the cropping pattern in the region; and (*ii*) to estimate the input-output relationship and the resource productivity and to examine the resource use efficiency in the area.

Methodology

The data used in the study are based on a survey of 30 farmers classified under four size-groups of holdings, *viz.*, 0-2 hectares, 2-4 hectares, 4-6 hectares and 6 hectares and above. The data pertain to two villages of Mahuva Extension Block of Banda district. The selection of block was purposive, however, the villages and the farmers were selected randomly. All the farmers in the selected villages were enumerated and the 30 farmers comprising 6, 9, 9 and 6 in the above-mentioned size-groups of holdings according to their proportional distribution in each size-group were selected. The data refer to the year 1969-70.

Empirical Results

Paddy and wheat are the important crops grown in the area. The area under the newly evolved high-yielding crop varieties is very negligible. This is partly because of absence of assured source of owned irrigation facili-

ties and indifferent attitude of farmers for application of higher doses of fertilizer, a pre-requisite to the High-Yielding Varieties Programme. This indifferent attitude to application of fertilizers has been due to the farmer's apprehension about the depleting effects of fertilizers on the succeeding crops. Physical productivity per hectare of important crops in the area as given in Table I is very low. Inadequate irrigation facility, lower level of manure

TABLE I—CROPPING PATTERN, COST OF CULTIVATION, PHYSICAL PRODUCTIVITY AND NET RETURN (PER HECTARE)

Crop	Percentage of sown area	Cost of cultivation (Rs.)	Yield (quintals)	Net returns (per hectare) (Rs.)
Paddy	37·32	375·69	14·75	378·03
Wheat	29·70	345·12	7·74	339·27
Wheat + gram	23·87	323·48	7·36	330·60
Jowar + *arhar*	6·62	290·51	5 3	339·49
Masoor	1·28	280·82	10·52	585·83
Others (pea, gram, jowar)	1·21	—	—	—

and fertilizer application are the reasons attributed for such a poor performance of the crop yields on the farms. The cost of cultivation is highest for paddy crop followed by wheat and wheat + gram. The net return per hectare was found to be highest for *masoor* followed by paddy.

Input-Output Analysis

In order to appraise the resource productivity and the efficiency of farmers in the use of farm resources, regression analysis with Cobb-Douglas type of production function was carried out at aggregate farm level.

$$Y = a\ X_1^{b1}\ X_2^{b2}\ X_3^{b3}\ X_4^{b4}$$

Where

Y = Gross income per hectare on farms.

X_1 = Human labour hours per hectare.

X_2 = Bullock labour hours per hectare.

X_3 = Expenditure on manure per hectare in rupees.

X_4 = Other total expenditure per hectare in rupees (expenditure on seed, irrigation charges, rent, overhead charges).

TABLE II—REGRESSION COEFFICIENT, MARGINAL VALUE PRODUCT AND RATIO OF MVP TO FACTOR COST

Items	Regression coefficient	Marginal value product (MVP)	Ratio of MVP to factor cost
1. Human labour hour	0·07417† (0·040674)	0·08	0·32
2. Bullock labour hour	0·28233* (0·10262)	0·79	1·05
3. Manure	0·12102* (0·05124)	2·98	2·98
4. Other inputs	0·25456* (0·12492)	2·19	2·19
Intercept in log	1·374		
R^2	0·8485		

† Significant at 10 per cent.
* Significant at 5 per cent.
Figures in parentheses denote standard errors of respective coefficients.

It is seen that all the four resources included in the equation are found to have significant and positive impact on per hectare farm crop return. Bullock labour and expenditures on items other than manure are the resources showing higher magnitudes of coefficient. The ratio of marginal value product to factor cost indicates that expenditure on manure shows the highest return per unit of cost followed by expenditure on other items comprising of irrigation, etc. The bullock labour productivity is nearly equal to its factor cost but the ratio of human labour productivity to its factor cost is less than one. This indicates that the farmers in the region are rational in the use of only bullock labour. They are not exploiting fully the economic opportunity of manure and other items of farm expenditure including irrigation as the level of use of these two resources is relatively low. On the other hand, they are making excess use of human labour resulting in its marginal productivity being lower than its acquisition cost. The productivity of labour could be increased either through cuts in its level of use or through an increase in the level of other resources or through both.

It was found that of the total labour hour used per hectare on the farm, 75 per cent of the requirement is met in the form of hired labour. Therefore a cut in the labour resource by one-fourth in the form of hired labour which is used in pre-harvesting operations such as ploughing, weeding, etc., and diverting funds to other farm expenditure has resulted in increasing the per hectare farm returns by 10.2 per cent. This has also resulted in increasing the productivity of human and bullock labour. The rationality of allocation of funds is such that the marginal value product per rupee expenditure in manure (X_3) and other expenditure (X_4) is equalized. The level of bullock labour use is not disturbed because it already pays for itself. However, in case of this adjustment there would emerge the scope for farm unemployment

which could be tackled only through opening new avenues for non-farm employment. In case non-farm employment opportunity is very remote, the productivity of farm labour as well as farm could be increased through an increase in the level of other resources with the help of credit. In Table III, credit worth 50 per cent (Rs. 104.42 per hectare) of funds being used in the form of manure (X_3) and expenses other than human and bullock labour is made available. The reallocation of funds increases the productivity of human and bullock labour both with their original levels of use. Farm return per hectare also increases by 16.76 per cent.

TABLE III—RESOURCE ALLOCATION THROUGH DIVERSION OF FUNDS FROM HIRED LABOUR OR CREDIT AVAILABILITY

Items	Human labour (X_1) (hour)	Bullock labour (X_2) hour)	Manure (X_3) (Rs.)	Other expenditure (X_4) (Rs.)	Per hectare farm return (Rs.)
Existing level of use	1204·21	479·22	54·43	155·62	1,342·02
Marginal Value Product ..	0·08	0·79	2·98	2·19	
Ratio of MVP to factor cost ..	0·32	1·05	2·98	2·19	
Allocated level of existing resource	903·16	479·22	91·84	193·21	1,477·00
MVP	0·12	0·87	1·95	1·95	
Ratio of MVP to factor cost ..	0·48	1·16	1·95	1·95	
Allocation with credit ..	1204·21	479·22	101·51	213·56	1,567·00
MVP	0·10	0·92	1·87	1·87	
Ratio of MVP to factor cost ..	0·40	1·22	1·87	1·87	

Acquisition cost of human labour=Re. 0·25 per hour and of bullock labour=Re. 0·75 per hour.

Thus it could be concluded that the farmers are handicapped with inadequacy of growth-promoting inputs such as manure and fertilizer, and irrigation facilities and are using the conventional input, labour in excessive quantity owing to the non-availability of other non-farm employment opportunity. The new technology of high-yielding varieties is still in its infancy owing to unassured irrigation facilities. Therefore, policy for the growth of this dry farming area should be formulated such that new irrigation potential is developed, improved varieties of crops thriving under low rain-fed condition are evolved and adequate provision for credit and non-farm employment is made for raising the farm productivity and for uplifting the standard of living of the people in the region.