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Analyzing the relative importance of the integrated agricultural systems towards the agricultural development

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ABSTRACT

At present, the farmers concentrate mainly on crop production which is subjected to a high degree of uncertainty in income and employment to the farmers. In this context, it is imperative to evolve suitable strategy for augmenting the income of a farm. Integration of various agricultural enterprises viz., cropping, animal husbandry, fishery, forestry etc. has paramount importance in the agricultural economy. These enterprises not only supplement the income of the farmers but also help in increasing the family labour employment A study was conducted in Katwa and Kalna sub-divisions of Burdwan district in West Bengal on Relative importance of the different integrated agricultural activities performed by farmers to augment their income as well as family labour employment. In such situation the researcher had determined to intervene the relative importance of the different integrated agricultural systems as perceived by the farmers. Structured interview schedule was used to obtain information from 60 progressive farmers. The data obtained were analyzed by frequency, percentage and paired comparison. The relative importance of integrated agricultural syatems as perceived by the farmers were integration of crop-horticulture, crop aquaculture, crop-agro-forestry, crop- livestock, and crop-agro processing and crop- allied activities or bio-gas production technique.

***Key words*:** Employment generation, income augmentation, integrated activity, paired comparison, structured interview

The “Green Revolution” technologies are often associated with environmental harm. Such damage is caused by the excessive use of mineral fertilizers and chemical pesticides as well as enhanced vulnerability to pests and diseases as a result of genetic homogeneity in the high yielding hybrid crop varieties cultivated over large contiguous areas. With increasing population there is a steady decline in the per capita availability of land and water. This makes higher productivity per unit of land and water imperative. Because of the environmental problems linked with traditional Green revolution technologies, higher productivity per unit of land and water must come from somewhat different production pathways. We have to produce more, but will have to do it differently. Inadequate purchasing power of large sections of people is due to lack of productive employment, modern industry is often not labour intensive and new jobs have to be found in the farm and non-farm sectors in rural areas. Productivity employment is an economic necessity because under conditions of smallholdings, income of family can be enhanced only through greater marketable surplus and multiple sources of income. Productivity improvement is also an ecological necessity since otherwise the remaining forests may be cleared for crop cultivation (Swaminathan, 1986). In such a situation the present study was conducted to analyse the relative importance of integrated agricultural systems as perceived by the farmers.

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MATERIALS AND METHODS

This deals with the research techniques and procedures to successfully complete the present study. The District Burdwan of West Bengal was selected purposively. Out of four agricultural sub-divisions of Burdwan district total two sub-divisions were selected for the present study. These two are Katwa and Kalna. Total ten blocks from Katwa and Kalna sub-division were selected. The ten blocks – Katwa-I, Katwa-II, Ketugram-I, Ketugram-II and Mangolkote from Katwa sub-division and Kalna-I, Kalna-II, Purbasthali-I, Monteshwar and Purbasthali-II from Kalna sub-division of Burdwan district of West Bengal were selected. In the present study, the purposive sampling procedures had been followed. The Katwa and Kalna sub-division of Burdwan district in West Bengal were selected purposively. Total five blocks of Katwa sub-division and five blocks of Kalna sub-division were selected. For the present investigation farmers in the Katwa and Kalna subdivision of west Bengal were selected as respondents. The study was conducted by total enumeration of the respondent from the two selected sub-divisions (ten blocks). In this way 35 farmers from Katwa sub-division and 25 farmers from Kalna sub-division were selected as respondents.The independent variables of this study include the demographic characteristics of the respondents’ such as age, gender, marital status, educational level, occupation, and contact with extension agents and farmers’ attitude. The Dependent variable of the study was sustained use of adopted technologies. The primary data were collected through the use of a structured and validated interview schedule consisting of both open and closed-ended questions to elicit information from the target respondents. Primary data collected include type of integrated farming, quantities of farm inputs and outputs and their prices and some socio- economic and demographic characteristics of the of the farmers. The statistical tools like paired comparison, frequency distribution, percentage were used to analyze the data and achieve the objectives. The following six integrated agricultural systems were identified for the present investigation. These are – Integration of

A. Crop-Aquaculture
B. Crop-Horticulture
C. Crop-Agro forestry
D. Crop-Agro processing
E. Crop- Livestock.
F. Crop -Biogas

It was intended to find out the relative importance of these above integrated agricultural systems as conducted by progressive farmers of Burdwan district in West Bengal. For this purpose the method of paired comparisons was followed.

RESULTS AND DISCUSSIONS

Six types of integrated agricultural systems were generally conducted by the farmers at Katwa and Kalna sub-division of W.B for agricultural development. To establish the hierarchy of integrated farming conducted by the Farmers; the method of paired comparison- (Edwards, 1969) was followed. The six integrated farming systems were presented to the farmers in pairs, in 15 possible combinations [6(6-1)/2=15]. The F-matrix or the frequency with which each column stimulus was judged more favorable than the row stimulus was obtained and is presented in following table 1.

Table 1: F-matrix for six integrated farming

Different integrated agril.activities	Crop–Aquaculture (A)	Crop-Horticulture (B)	Crop-Agro forestry (C)	Crop-Agro processing (D)	Crop-Livestock (E)	Crop -Biogas (F)
Crop–Aquaculture (A)	-	38*	24	16	21	28
Crop-Horticulture (B)	22	-	32	15	25	23
Crop-Agro forestry (C)	36	28	-	33	18	24
Crop-Agro processing (D)	44	45	27	-	33	18
Crop- Livestock (E)	39	35	42	27	-	23
Crop -Biogas (F)	32	37	36	42	37	-

[To be understood as 38 Farmers preferred Crop- Horticulture to Crop –Aquaculture and so on i.e. the column stimulus judge more favorable than the row stimulus].The cell entries in the diagonal line were, therefore, vacant we assume to be N/2 i.e. 60/2 = 30.00 in each case. The cell entries of F-matrix were divided by N [the total number of respondents; 60] to get the P-matrix. This is presented in the Table 2. The cell entries of P-matrix judged more favorable than the row stimulus.*

Table 2: P-matrix corresponding to the F-matrix

Different integrated agril. activities	Crop–Aquaculture (A)	Crop-Horticulture (B)	Crop-Agro forestry (C)	Crop-Agro processing (D)	Crop-Livestock (E)	Crop –Biogas (F)
Crop–Aquaculture (A)	0.500	0.634	0.400	0.267	0.350	0.467
Crop-Horticulture (B)	0.367	0.500	0.534	0.250	0.416	0.383
Crop-Agro forestry (C)	0.600	0.467	0.500	0.550	0.300	0.400
Crop-Agro processing (D)	0.734	0.750	0.450	0.500	0.550	0.300
Crop- Livestock (E)	0.650	0.583	0.700	0.450	0.500	0.383
Crop -Biogas (F)	0.534	0.616	0.600	0.700	0.616	0.500
SUM	3.385	3.550	3.184	2.717	2.732	2.433

It has been stated earlier that the cell entries in the diagonal line which were blank in the F-matrix were assumed to be $^{N}/_{2}$ i.e. 30 in each case divided by N, gave a proportion of 0.500 which has been shown in each cell of the diagonal line in the P-matrix. The P-matrix was then rearranged with the stimulus having the smallest column sum at the left and that with the highest at the right. For this purpose the column stimuli in the table ahead were rearranged from smallest to highest as F, D, E, C, A, and B. This gave the rearranged p-matrix, which is presented in Table 3. The column sum for each stimulus was obtained by adding the respective cell entries, taking the sign into consideration. The mean values were obtained by dividing the sums with the total number of stimuli (6 in the study). The absolute scale value of the stimulus with the largest negative deviation (0.242) was added to all the column means to make the scale value for this stimulus zero and all of the others with positive sign. The hierarchy of integrated agricultural systems of progressive farmers at Katwa and Kalna subdivision of W.B and the scale values are presented in the Table 5 and diagrammatically in following figure 1.

Table 3: Rearranged P-matrix smallest to highest column sum

Different integrated agril. activities	Crop– Aquaculture (A)	Crop- Horticulture (B)	Crop-Agro forestry (C)	Crop-Agro processing (D)	Crop- Livestock (E)	Crop –Biogas (F)
Crop -Biogas (F)	0.500	0.700	0.616	0.600	0.534	0.616
Crop-Agro processing (D)	0.300	0.500	0.550	0.450	0.734	0.750
Crop- Livestock (E)	0.383	0.450	0.500	0.700	0.650	0.583
Crop-Agro forestry (C)	0.400	0.550	0.300	0.500	0.600	0.467
Crop –Aquaculture (A)	0.467	0.267	0.350	0.400	0.500	0.634
Crop-Horticulture (B)	0.383	0.250	0.416	0.534	0.357	0.500
SUM	2.433	2.717	2.732	3.184	3.385	3.550

The Z-matrix corresponding to the rearranged P-matrix was obtained by converting the Pij entries to Zij entries with the help of table given by Edwards (1669) and this is presented in the Table 4.

Table 4: Z-matrix – hierarchy of integrated agricultural activities

Different integrated agricultural systems	Crop - Biogas (F)	Crop-Agro processing (D)	Crop- Livestock (E)	Crop-Agro forestry (C)	Crop – Aquaculture (A)	Crop- Horticulture (B)
Crop -Biogas (F)	0.000	0.524	0.295	0.253	0.085	0.295
Crop-Agro processing (D)	-0.524	0.000	0.126	-0.126	0.625	0.674
Crop-Livestock (E)	-0.298	-0.126	0.000	0.524	0.385	0.210
Crop-Agro forestry (C)	-0.253	0.126	-0.524	0.000	0.253	-0.083
Crop–Aquaculture (A)	-0.083	-0.622	-0.385	-0.253	0.000	0.342
Crop-Horticulture (B)	-0.298	-0.674	-0.212	0.085	-0.340	0.000
SUM Z	-1.456	-0.772	-0.700	0.483	1.008	1.438
Mean Z	-0.242	-0.128	-0.116	0.080	0.168	0.239
Add largest negative deviation	+0.242	+0.242	+0.242	+0.242	+0.242	+0.242
Rank (Scale value) R	0.000	0.114	0.126	0.322	0.410	0.481

Table 5: Relative importance of the agricultural activities according to their scale values

Sl. No.	Extension activities	Scale values	Rank
1.	Crop-Horticulture	0.481	I
2.	Crop –Aquaculture	0.410	II
3.	Crop-Agro forestry	0.322	III
4.	Crop- Livestock	0.126	IV
5.	Crop-Agro processing	0.114	V
6.	Crop -Biogas	0.000	VI

The present findings were based on the responding of 60 progressive farmers spread over Katwa and Kalna sub-division of Burdwan district in W.B. From the Table-5 and figure, it was found that out of six integration of different agricultural systems, the integration of crop production and horticulture had the highest scale value and was considered as the most important activity to be carried out by the farmers of Katwa and Kalna sub-division of Burdwan district in West Bengal. The Paired comparison of the study reflexed the hierarchy level of integrated agricultural systems of the farmers at Burdwan district of West Bengal. The integration of crop-horticulture, crop –aquaculture, crop-agro forestry, crop- livestock production, crop-agro processing and crop –biogas were the integrated agricultural activities conducted by the farmers ranked from the highest to the lowest respectively.

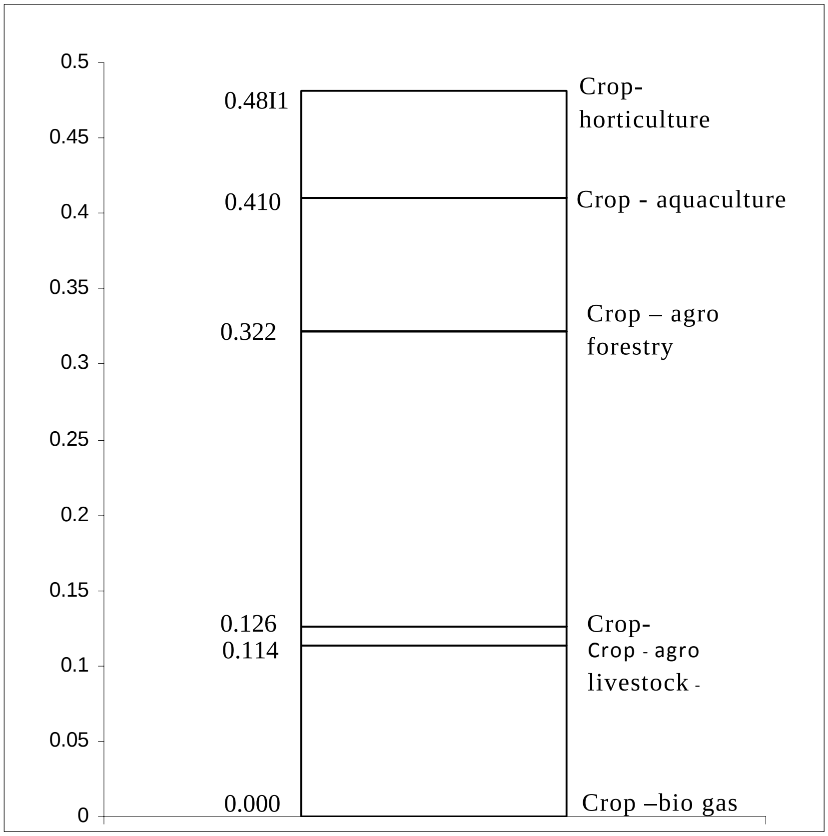

Fig.1: Bar diagram showing the hierarchy of integrated agricultural activities as perceived by the farmers

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