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A Study on Efficiency of Water Use for Paddy and Banana and the Relationship between the Characteristics of the Respondents

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***Abstract*-** A Study was conducted in Kanayakumari district to find out the efficiency of water use for paddy and banana and the relationship between the characteristics of the respondents and the efficiency of water use. The study reveals that 60.67 per cent of the respondents had low water use efficiency and 25.33 per cent of them had medium water use efficiency in paddy. Only 14.00 per cent of them had high water use efficiency in paddy. This study also shows that 61.33 per cent of them had low water use efficiency followed by medium water use efficiency (21.33 per cent) in banana. Only 17.34 per cent had high water use efficiency in banana.

I. INTRODUCTION

Water and land are the two important assets of any country and proper utilization of them can bring prosperity to living society. Future gain in irrigation depends on increasing water use efficiency, rather than increasing water supply. This means using more efficient, low-cost and locally-adapted technologies to reduce water loss. Small-scale irrigation can help farmers to increase yields. The present study was undertaken to study the efficiency of water use for paddy and banana and the relationship between the characteristics of the respondents and the efficiency of water use.

II. METHODOLOGY

The study was carried out in Kanyakumari district. There are four taluks in Kanyakumari district viz; Agastheeshwaram, Thovalai, Kalkulam and Villavancode. All the four taluks were identified for collection of data. One block from each taluk was selected randomly. From each block, one village was randomly selected. Thus a total of four villages viz; Theroor, Vellamadam, Arumanai and Karungal were selected for data collection. The lists of farmers in the selected villages were obtained from Village Extension Workers concerned. A sample of 300 respondents was selected from the four villages by identifying equal number of respondents (75) randomly from each of the villages. The data were collected from 300 farmers. A well structured interview schedule was used for the data collection. The data were collected from the selected farmers through personal interview method. To assess the efficiency of water use it is the ratio of yield and amount of water used. It may be expressed as the ratio of dry weight of produce i.e., the yield to the volume of water used by the crop as evapotranspiration, or the total amount of water used in the field.

III. EFFICIENCY OF WATER USE FOR PADDY

The results on distribution of respondents according to their efficiency of water use for paddy are given in Table 1.

Table 1: Distribution of respondents according to their efficiency of water use for paddy

(n=300)

S.No	Category	Number of respondents	Per cent
1	Low	182	60.67
2	Medium	76	25.33
3	High	42	14.00
	Total	300	100.00

It may be observed from the Table 1 that majority of the respondents (60.67 per cent) had low water use efficiency followed by medium water use efficiency (25.33 per cent). Only 14.00 per cent had high water use efficiency.

IV. EFFICIENCY OF WATER USE FOR BANANA

The results on distribution of respondents according to their efficiency of water use for banana are given in Table 2.

Table 2 Distribution of respondents according to their efficiency of water use for Banana

(n=300)

S.No	Category	Number of respondents	Per cent
1	Low	184	61.33
2	Medium	64	21.33
3	High	52	17.34
	Total	300	100.00

It may be observed from the Table 2 that majority of the respondents (61.33 per cent) had low water use efficiency followed by medium water use efficiency (21.33 per cent). Only 17.34 per cent had high water use efficiency.

V. RELATIONSHIP BETWEEN PROFILE OF THE RESPONDENTS AND EFFICIENCY OF WATER USE

The zero-order correlation was computed to know the relationship of the socio-economic and psychological characteristics of respondents with their efficiency of water use for paddy. The results are given in Table 3.

Table 3 Zero-order correlation of characteristics of respondents with their efficiency of water use for paddy

(n=300)

Variable No	Independent variables	Correlation coefficient
X_1	Age	0.106*
X_2	Education	0.231**
X_3	Occupation	0.046NS
X_4	Farm size	-0.008NS
X_5	Farming experience	0.115*
X_6	Annual income	-0.011NS
X_7	Cropping intensity	0.037NS
X_8	Irrigation intensity	0.137*
X_9	Productivity	0.042NS
X_{10}	Source of irrigation	-0.004NS
X_{11}	Method of irrigation	0.056NS
X_{12}	Social participation	-0.062NS
X_{13}	Extension agency contact	-0.102NS
X_{14}	Innovativeness	0.131*
X_{15}	Risk orientation	0.047*
X_{16}	Scientific orientation	0.045*
X_{17}	Economic motivation	0.047NS
X_{18}	Mass media exposure	-0.009NS

** Significant at 1 per cent
* Significant at 5 per cent
NS Non-significant

Out of the eighteen independent variables taken for analysis, age, education, farming experience, irrigation intensity, innovativeness, risk orientation, and scientific orientation were found to have positive significant relationship with the efficiency of water use.

Age showed a positive and highly significant relationship with the efficiency of water use for paddy crop. As the age increases their experience made them efficient to use the available water. This is in line with the findings of Flora (2007).
Educational status was found to have positive and highly significant relationship with the efficiency of water use for paddy crop. Obviously, educated respondents develop a positive attitude towards efficiency of water use.

Farming experience showed a positive and highly significant relationship with the efficiency of water use for paddy crop. Majority of the respondents were having high to medium level of experience. This might have influenced them to greater water use efficiency in paddy farming. As the farming experience increases their experience made them efficient to use the available water. This is in line with the findings of Vignesh (2006).

Irrigation intensity showed a positive and highly significant relationship with the efficiency of water use for paddy crop. As the irrigation intensity increases the efficiency of water use also increases because they get water from different sources.

Innovativeness showed a positive and significant relationship with the efficiency of water use for paddy crop. This shows more the innovativeness more will be the efficiency of water use. It is obvious that innovativeness could contribute to the efficiency of water use, for more the innovativeness more the farmers would try to acquire information about the new technologies to increase the efficiency of water use.

Risk orientation showed a positive and highly significant relationship with the efficiency of water use for paddy crop. Risk orientation develops the respondent's ability to face the odds in farming. Thus, increase in risk orientation increases the efficiency of water use of respondents. This finding is in line with the findings of Saravanan (2005).

Scientific orientation was found to be significantly correlated with the efficiency of water use of the respondents. Respondents with more scientific orientation will definitely gather information on new technologies and they use the water efficiently.

The zero-order correlation was computed to know the relationship of the socio-economic and psychological characteristics of respondents with their efficiency of water use for paddy. The results are given in Table 4.

Table 4 Zero-order correlation of characteristics of respondents with their efficiency of water use for Banana.

(n=300)

Variable No	Independent variables	Correlation coefficient
X_1	Age	-0.012
X_2	Education	0.211**
X_3	Occupation	-0.022NS
X_4	Farm size	-0.018NS
X_5	Farming experience	-0.228*
X_6	Annual income	-0.012NS
X_7	Cropping intensity	0.153**
X_8	Irrigation intensity	0.227*
X_9	Productivity	0.001NS
X_{10}	Source of irrigation	0.019NS
X_{11}	Method of irrigation	0.035NS
X_{12}	Social participation	-0.073NS
X_{13}	Extension agency contact	0.233*
X_{14}	Innovativeness	0.233*
X_{15}	Risk orientation	0.007NS
X_{16}	Scientific orientation	0.116**
X_{17}	Economic motivation	-0.013NS
X_{18}	Mass media exposure	-0.033NS

** Significant at 1 per cent
* Significant at 5 per cent
NS Non-significant

Out of the eighteen independent variables taken for analysis, education, farming experience, cropping intensity, irrigation

intensity, extension agency contact, innovativeness, and scientific orientation were found to have positive significant relationship with the efficiency of water use for banana.

Educational status was found to have positive and highly significant relationship with the efficiency of water use for banana. Obviously, educated respondents develop a positive attitude towards efficiency of water use.

Farming experience showed a positive and highly significant relationship with the efficiency of water use for banana. As the farming experience increases their experience made them efficient to use the available water.

Cropping intensity showed a positive and highly significant relationship with the efficiency of water use for banana. As the cropping intensity increases the efficiency of water use also increases because more crops use the water efficiently.

Irrigation intensity showed a positive and highly significant relationship with the efficiency of water use for banana. As the irrigation intensity increases the efficiency of water use also increases because they get water from different sources.

Extension agency contact was found to have positive and highly significant relationship with the efficiency of water use for banana. More contact with extension agencies leads to increase in the efficiency of water use.

Innovativeness showed a positive and significant relationship with the efficiency of water use for banana. This shows more the innovativeness more will be the efficiency of water use. It is obvious that innovativeness could contribute to the efficiency of water use, for more the innovativeness more the farmers would try to acquire information about the new technologies to increase the efficiency of water use. This finding is in line with the findings of Vengatachalam (2005).

Scientific orientation was found to be significantly correlated with the efficiency of water use of the respondents. Respondents with more scientific orientation will definitely gather information on new technologies and they use the water efficiently. This finding is in line with the findings of Flora (2007).

VI. Regression of Characteristics of Respondents with their Efficiency of Water Use

Regression was computed to know the relationship of characteristics of the respondents with their efficiency of water use. The results are given in Table 5 and 6.

Table 5 Regression of characteristics of respondents with their efficiency of water use for paddy

(n=300)

Variable No	Variables	Regression coefficient	Standard Error	't' Value
X_1	Age	0.279	0.124	2.254*
X_2	Education	0.020	0.289	2.690**
X_3	Occupation	0.062	0.067	0.923NS
X_4	Farm size	-0.026	0.137	-0.191NS
X_5	Farming experience	0.023	0.014	1.615NS
X_6	Annual income	0.009	0.001	0.196NS
X_7	Cropping intensity	0.039	0.086	1.980*
X_8	Irrigation intensity	-0.105	0.035	-0.994NS
X_9	Productivity	0.057	0.138	2.118*
X_{10}	Source of irrigation	0.008	0.040	0.202NS
X_{11}	Method of irrigation	0.072	0.040	1.825*
X_{12}	Social participation	-0.065	0.052	-1.241
X_{13}	Extension agency contact	0.028	0.015	1.828*
X_{14}	Innovativeness	0.114	0.049	2.353**
X_{15}	Risk orientation	0.032	0.145	2.489**
X_{16}	Scientific orientation	0.054	0.378	1.693*
X_{17}	Economic motivation	0.024	0.044	0.538NS
X_{18}	Mass media exposure	-0.001	0.015	-0.058NS

$R^{2=}0.614$ F=4.894

** Significant at 1 per cent
* Significant at 5 per cent
NS Non-significant

It could be observed from the Table 5 that all the eighteen variables together explained 0.614 per cent of variation in efficiency of water use. The 'F' value 4.894 was found to be significant. It could be concluded that a linear functional relationship between independent variables and dependent variables could be established.

Of the eighteen variables taken for analysis, education, innovativeness, and risk orientation were positively significant at 0.01 per cent level of probability. Age, cropping intensity, productivity and method of irrigation, extension agency contact and scientific orientation were positively significant at 0.05 per cent level of probability towards efficiency of water use for paddy.

The analysis revealed that a unit increase in age, education, cropping intensity, productivity, method of irrigation, extension agency contact, innovativeness, risk orientation and scientific orientation would increase efficiency of water use for paddy by 0.279, 0.020, 0.039,0.057, 0.072, 0.028,0.114,0.032,and 0.054 units respectively.

Age showed a positive and highly significant relationship with the efficiency of water use for paddy crop. As the age increases their experience made them efficient to use the available water. This is in line with the findings of Flora (2007).
Educational status was found to have positive and highly significant relationship with the efficiency of water use for paddy. Obviously, educated respondents develop knowledge towards efficiency of water use.

Cropping intensity showed a positive and highly significant relationship with the efficiency of water use for paddy. As the cropping intensity increases the efficiency of water use also increases because more crops use the water efficiently.

Productivity showed a positive and highly significant relationship with the efficiency of water use for paddy. As the productivity increases the efficiency of water use also increases because the water use efficiency is expressed by the ratio of yield and water used. This finding is in line with the findings of Flora (2007).

Method of irrigation showed a positive and highly significant relationship with the efficiency of water use for paddy. Controlled irrigation increases the efficiency of water use, because the wastage of water is very less. This finding is in line with the findings of Vignesh (2006).

Extension agency contact was found to have positive and highly significant relationship with the efficiency of water use for paddy. More contact with extension agencies leads to increase in the efficiency of water use.

Innovativeness showed a positive and significant relationship with the efficiency of water use for paddy. This shows more the innovativeness more will be the efficiency of water use. It is obvious that innovativeness could contribute to the efficiency of water use, for more the innovativeness more the farmers would try to acquire information about the new technologies to increase the efficiency of water use.

Risk orientation showed a positive and highly significant relationship with the efficiency of water use for paddy. Risk orientation develops the respondent's ability to face the odds in farming. Thus, increase in risk orientation increases the efficiency of water use of respondents. This finding is in line with the findings of Vengatachalam (2005).

Scientific orientation was found to be significantly correlated with the efficiency of water use of the respondents. Respondents with more scientific orientation will definitely gather information on new technologies and they use the water efficiently. This finding is in line with the findings of Flora (2007).

Table 6 Regression of characteristics of respondents with their efficiency of water use for Banana

(n=300)

Variable No	Variables	Regressioncoefficient	Standard Error	't' Value
X_1	Age	0.164	0.267	2.148*
X_2	Education	0.049	0.062	2.616**
X_3	Occupation	-0.122	0.144	-0.810NS
X_4	Farm size	0.193	0.295	0.851NS
X_5	Farming experience	-0.023	0.031	-0.657NS
X_6	Annual income	0.001	0.002	0.601NS
X_7	Cropping intensity	0.109	0.087	2.262*
X_8	Irrigation intensity	0.037	0.076	0.591NS
X_9	Productivity	0.049	0.110	0.494NS
X_{10}	Source of irrigation	0.006	0.086	0.524NS
X_{11}	Method of irrigation	0.077	0.089	0.073NS
X_{12}	Social participation	0.001	0.113	0.899NS
X_{13}	Extension agency contact	0.031	0.033	0.001NS
X_{14}	Innovativeness	0.183	0.105	1.961*
X_{15}	Risk orientation	0.212	0.142	1.752*
X_{16}	Scientific orientation	0.337	0.167	1.490NS
X_{17}	Economic motivation	0.131	0.095	2.015NS
X_{18}	Mass media exposure	0.025	0.033	1.377NS

$R^{2=}0.512$ F=5.162

**Significant at 1 per cent
* Significant at 5 per cent
NS Non-significant

It could be observed from the Table 6 that all the eighteen variables together explained 0.512 per cent of variation in efficiency of water use. The 'F' value 5.162 was found to be significant. It could be concluded that a linear functional relationship between independent variables and dependent variables could be established.

Of the eighteen variables taken for analysis, education was positively significant at 0.01 per cent level of probability. Age, cropping intensity, innovativeness and risk orientation were positively significant at0.05 per cent level of probability.

Of the eighteen variables taken for analysis, age, education, cropping intensity, innovativeness and risk orientation would increase efficiency of water use for banana by 0.164, 0.049, 0.109, 0.183 and 0.212 units respectively.

Age showed a positive and highly significant relationship with the efficiency of water use for banana. As the age increases their experience made them efficient to use the available water.

Educational status was found to have positive and highly significant relationship with the efficiency of water use for banana. Obviously, educated respondents develop a positive attitude towards efficiency of water use.

Cropping intensity showed a positive and highly significant relationship with the efficiency of water use for banana. As the cropping intensity increases the efficiency of water use also increases because more crops use the water efficiently.

Innovativeness showed a positive and significant relationship with the efficiency of water use for banana. This shows more the innovativeness more will be the efficiency of water use. It is obvious that innovativeness could contribute to the efficiency of water use, for more the innovativeness more the farmers would try to acquire information about the new technologies to increase the efficiency of water use.

Risk orientation showed a positive and highly significant relationship with the efficiency of water use for banana. Risk orientation develops the respondent's ability to face the odds in farming. Thus, increase in risk orientation increases the efficiency of water use of respondents. This finding is in line with the findings of Vengatachalam (2005).

VII. CONCLUSION

This study clearly shows that majority of the farmers possess low water use efficiency. Hence, it is suggested to conduct farmers field school to create awareness and motivate the farmers to adopt the irrigation management technologies to increase the efficiency of water use.

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