

Sustainable Rice Cultivation Practices in Different Micro Farming Situations in West Bengal

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Abstract: It is well known that farmers vary their practices of crop cultivation across different micro farming situations. On a particular stretched field keeping the crop and varietal duration constant (*boro* rice), the farmers, on the basis of their indigenous knowledge and experience classified the land in 7 micro farming situations. Data on selection of varieties, time of sowing, seed rate, fertilizer type for seed bed and main bed, amount of fertilizer in seed bed and main bed, pesticides used, age of seedlings while transplanting, dates of transplanting, top dressing of fertilizer, weeding, weeding technology, irrigation, time of harvesting and yield of 162 plots, which were selected proportionately from the total 396 plots of the continuous crop field, were the variables on which statistical analysis was done to test the association of the variables with micro farming situation. The criteria of classifying micro farming situation may be established as universally logical. The scope of identifying geographically homogeneous farming situations and the recommendation domain is there in further. It was found that significant association exists between the micro farming situation and each of the variables. Weed diversity count and collection of information about cost of land was done as a validity test of the farmers' classification and identification of micro farming situations. It is concluded that farmers' classification is valid in the zone and if major micro farming situations can be identified from the area, recommendation domain can be selected and particular package of practices can be suggested.

Keywords: Indigenous Knowledge, Micro Farming Situation, PRA, Farmers' Classification, Validation,

INTRODUCTION

Both in agricultural and social sciences, complexity and diversity has been under perceived and undervalued which resulted in its neglect, under estimation and exclusion from government statistics and policy framework (Chambers, 1990). The archetypal Green Revolution technologies and 'transfer-of-technology' paradigm has also historically failed to cater to the needs of resource-poor agro-ecosystem in the third world (Pender and Hazell, 2001). Extension offered blanket recommendation for wide geographical area and was used as a deterministic 'dart gun' (Roling, 1988) i.e., 'take the technology and transfer to the farmers'. The heterogeneity of the farming systems for which different technologies were needed, has been ruefully

ignored. As a result, the adoption of agricultural technologies has remained astonishingly low in comparison to commercial innovations. Fortunately, farmers' reality/farm reality has now come into focus. Examples received from different parts of the globe reemphasizes the need to examine 'recommendation domains' carefully and in detail, "even in cases in which technologies are developed and already in use by farmers operating under what appear to be circumstances quite similar to possible 'recipients' of such technologies" (Fujisaka *et al.*, 1993). Micro farming situation may be viewed as an inseparable issue from the farm reality. Logical elaboration of it can offer directionality in overcoming the long practiced blanket

approach of technology transfer. Local people use many categories in different parts of the world to describe types of soil (Dialla, 1993), lands (Ettema, 1994), landscapes, crops, wild plant species (Berlin, 1992) and other natural resources. The categories and names used by them usually differ from those used by scientists. In addition the criteria of classification are usually functional, that is related to use, unlike the standard categorization criteria derived from physical sciences (Chambers *et al.*, 1989). The central idea of the concept of Micro Farming Situation is micro environment. A micro-environment is a "distinct small-scale environment which differs from its surroundings, presenting sharp gradients or contrasts in physical conditions, internal and/or externally. Micro-environments can be isolated, or contiguous or repetitive, and natural or made by people or domestic animals" (Chambers, 1990). However, here, the micro-farming situation is conceptualized as a conglomeration of ecological as well as socio-economic dimensions; this is done specially keeping the recommendation domain as the converging point ahead. A Micro farming situation may be thought as a sub-system of a relatively large farming situation, which is relatively homogeneous in nature (and naturally possesses some distinguishable characteristics from the larger system or from another such sub-system). While making decisions regarding any farming activity, those micro farming situations are consulted upon cognitively. Understanding of micro farming situation is an inseparable issue of analyzing farm heterogeneity and it provides a logical elaboration of the recommendation domain (RD) with an additional element of ensured farmer participation (Basu *et al.*, 1996). The research on farmers' reality and farm reality, though out of mainstreaming, may be marked as the Farming System Research. Examples received from different parts of the globe reemphasize the need to examine 'Recommendation Domains (RD)' – an archetypal concept associated with Farming System Research. A Recommendation Domains is a group of farmers whose circumstances are similar enough that they will be eligible for the same recommendation (Harrington and Tripp, 1984). This basic idea of targeting can be found

in the context of social marketing (Kotler and Andreasen, 1991) and this is also advocated by extensionists (Roling, 1988). The criteria, on the basis of which a particular micro farming situation is constructed of (or distinguished from another micro farming situation), is strictly subjective and goes with the perception and individual construct of the farmers. Local people use many categories in different parts of the world to describe types of lands, landscapes, crops, wild plant species and other natural resources. Farmers are not only good at classifying the farming situation where they operate; they are good at classifying themselves in terms of a whole gamut of criteria which may be as diverse as socio-economic, ecological, infrastructural and even political. With the revolution of participatory appraisal techniques like RRA, PRA and PLA there are now a good set of tools to classify farmers and their farming situation. Farmers use the rationale getting originated at the cognitive level to make decisions regarding farm-related activities. These activities may be as varied as crop selection, variety selection, sowing, harvesting, intercultural operation, cropping sequence, manure and fertilizer application, drainage, irrigation scheduling, pest problem etc. However, before the application and further scaling up of such tools a series of multi-locational validation will be asked for on the basis of empirical observations. This may be helpful for grass root level agricultural planning for decentralized self-governing bodies. The present study was conducted to validate the above mentioned tools (classification of micro-farming situation and farmers' self-classification of the rice growers) in terms of their rice cultivation practices. The present study was undertaken to classify the micro-farming situations of the study area according to farmers' perception and to compare the rice cultivation practices of farmers across these identified micro-farming situations. The significant difference of *boro* rice growing practices among the identified micro farming situations will validate the farmers' classification of *boro* rice farming situation. It is well known that farmers vary their practices of crop cultivation across different micro farming situations. But, less empirical evidences have

been found on the differential practices of the farmers in respect to different micro farming situations keeping the crop constant (Goswami *et al* 2012.). Farmers' classification system varies from place to place, time to time and even season to season, based for cultivation of crops in over a big chunk of apparently homogeneous lands. Considering the rich indigenous knowledge of the farmers a school of knowledge associated with ethnopedology and empirical work may be initiated in the present study. The association of farmers' classification system of the land and respective cultivation practices of a specific crop (keeping the crop and the varietal duration constant) had been studied statistically to prove that this classification system had validity in interpreting farmers' decision making. Some external indicators like Bio diversity index (here only weed diversity has been studied for the simplification of work) and cost of the land was studied parallelly to understand the diversity of micro farming situations. The present study became imperative to understand the farmers' classification systems, their effect on crop cultivation practices in relation to validating their classification system. The objective of the present study is to find out the different classification of rice farmers in micro farming situation and their validation on the basic of external criteria followed by different agronomic practices.

METHODOLOGY

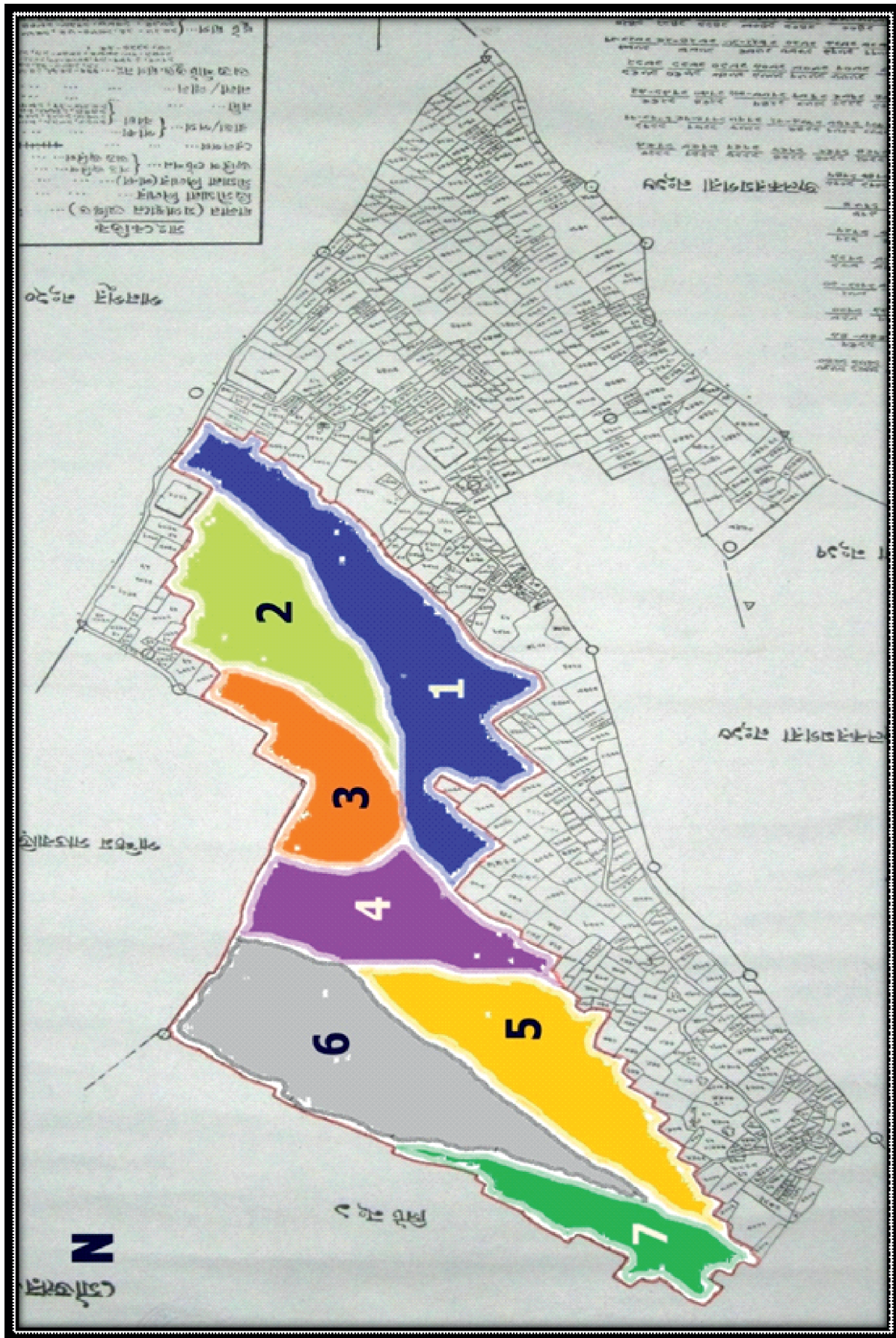
The study area required major rice growing villages having rice fields at one stretch. In Bijra village the study was conducted. The village is under Haringhata block of Nadia district, West Bengal. The selection was done due to following reasons: the village has the continuous, stretched, single cropped field, which was the prime requirement to increase the accuracy of the study; as the field is stretched and same crop is grown in one season (*Boro*) the validation of farmers' identification of different Micro Farming Situations can be done easily by comparative study; there is ample scope for collecting relevant data for the study; the area is near to the residence of the researcher; the area was easily accessible to the researcher in terms of transportation and availability of relevant

and important materials and information from the Gram Panchayat Office and Block Level Revenue Office. The revenue map of the bijra mouza was collected from Block Level Revenue Office. Interview schedule had 2 parts. The 1st part encompasses back ground information of the farmers and the 2nd and main part exposes the farmers' cultivation practices. Proportionate Random Sampling was followed to select 162 plots from the universe. A map of the field and delineated micro farming situations has been presented in Map No. 1.

Based on the identified sample plots their owners were identified for data collection. Finally 52 farmers were identified for interviewing. A structure of interview schedule was prepared for different *Boro* rice cultivation practices with the help of literature survey, discussion with the experts from relevant fields of agriculture. The variables were Variety of *Boro* rice; Time of Sowing; particular Week of the Month; Seed Rate: Kg/Ha; Seed Treatment Chemicals; Fertilizer type in seed bed: Direct/Complex/Organic; Amount of Fertilizers applied in seed bed: Organic & chemical fertilizer in Quintal/Ha; Pesticides used in seed bed; Fertilizer type in main bed: Direct/Complex/Organic; Amount of Fertilizers and Lime applied in main bed: Organic, Chemical and Lime fertilizer in Quintal/Ha; Date of transplanting; particular Week of the Month; Age of seedlings at the time of transplanting; Days; Spacing: cm; Pesticides used in main bed; Weeding Technique: Manual (number of weeding) and Chemical; Herbicides applied; Date of 1st manual weeding; Days after Transplanting; Date of 2nd manual weeding; Days after Transplanting; Date of 1st Top dressing; Days after Transplanting; Date of 2nd Top dressing; Days after Transplanting; Date of 3rd Top dressing; Days after transplanting; Amount of total Top dressed Fertilizers: Kg/Ha; Number of Irrigation; Time of Harvesting; particular Week of Month; Yield: Pockets/Ha (60 Kg/ Packet).

PREPARATION OF MICRO FARMING SITUATION MAP

A number of groups of farmers were met in different gathering spots of the farmers. The spots



Map 1. Micro Farming Situations

were identified during the pilot survey and with the help of key informants. At evening time the tea stalls were the main gathering spots where at a time a good number of farmers spent their leisure time. The other important spots were a grocery shop, a big tree shade on the bank of a pond and the mosque. Sitting with the farmers, by PRA technique, Micro Farming Situation map of the continuous rice field of Bijra village was prepared marking on the revenue map. Characteristics of farming situations on the basis of which farmers classified the 7 micro farming situations are Land situation (up/medium/low); Fertility status; Water Holding Capacity of the soil; Cropping intensity; Irrigation facility; Soil type (sandy/clay/Loamy) and Productivity. After selecting the sample plots from different micro farming situations and identifying the farmers who cultivated the *boro* rice on those particular plots interview was taken. Being present on the sample plots with the farmer detailed data on practices was collected. Simultaneously the back ground information of the farmers was collected. From each micro farming situations after harvesting of crops, 2 months later weed count was taken. 1 square meter area was measured on the plot and the different species of weeds was identified and written down. The number of the weeds of the species were counted and noted down with respective species. The unknown species was collected and identified later by expert. Necessary statistical tools such as percentage, mean, standard deviation, Chi Square, ANOVA, PRA technique, Micro Farming Situation map, Focussed Group Discussion, Fisher's Exact Test use of software SPSS 16.0 etc.

RESULTS AND DISCUSSION

General description of the society: livelihood status of the farmers

During the study, the socio economic conditions of the farmers who cultivated in the '*Bijra-r Math*' were studied. In target of understanding the livelihood of the entire farmer society, some other farmers were also interviewed. Total 82 farmers were interviewed randomly. Analysis of their response gives an overall idea about the society. 7.3 per cent of the farmers were under

the age 35. In the age group of 36 to 45, there were 34.1 per cent farmers. 35.4 per cent farmers were under the age group 46-55. There were 23.1 per cent farmers who were more than 55 years old. 52.4 per cent farmers had a medium size family. 17.1 per cent farmers had a large size family and 30.5 per cent farmers belong to small size family. 35.4 per cent farmers had a education up to junior high standard. 24.4 per cent farmers passed secondary standard. Another 24.4 per cent farmers left school after completion of primary school education. 8.5 per cent farmers had an education more than secondary and 7.3 per cent farmers were illiterate. Agriculture is the only occupation for 62.2 per cent farmers. 7.3 per cent farmers were involved in agriculture and allied farm business. 17.1 per cent farmers had family business besides agriculture. 9.8 per cent farmers were also in some government or private service, such as primary school teaching, agency etc. 4.9 per cent farmers had some other jobs like private car driving etc. 41 per cent farmers had own land holding less than 5 Bigha, 47 per cent farmers have 5-10 Bigha and less than 10 per cent farmers had more than 10 Bigha of own cropping land. Among the farmers 87 per cent have less than 5 bigha of shared cropping land. Except 1-2 per cent of rest of the farmers have a shared cropping land 5-10 Bigha. 64.6 per cent farmers had high income from agriculture. 18.3 per cent farmers had medium income and 17.1 per cent farmers had low income from agriculture. Most of the farmers were experienced in *boro* rice cultivation for more than 20 years. 6.1 per cent farmers were experienced for even more than 30 years. More than half of the family did not have pond. Only 28 per cent families had own pond. 23.8 per cent farmers had high household material possession and 35.4 per cent had minimum household materials. 25.6 per cent farmers had high possession of farm implements whereas most of the farmers had low level of farm material possession. Though most of the farmer families had some poultry birds and goats, the numbers of pets was very few and were used not as source of income. Maximum families had not enough cattle to get the supply of manure for their crop field. Only 2 farmers received some kind of training about agriculture among the whole 82

numbers of farmers. For most of the farmers, source of information about agriculture were the local progressive farmers. Discussion with the fellow farmers was another well practiced culture of the farmers of that area to get solutions of different agricultural problems. About half of the farmers had the land holding 0.66-1.3 Ha of land holding. Only 9.8 per cent farmers had a larger land holding. According to the farmers the major problems they were facing while cultivating rice are, labour problem: labours are not being available and demanding high rate; the fertilizer price in market is very high. Only subsidy from government may help them and the market price they are getting for rice is very less. Some other problems were also identified such as-irrigation problem, high cost of electricity, lack of bio-fertilizer, high emergence of weeds of new species. Their persuasion said that production is not increasing by using chemical fertilizer and fertility of the land is decreasing which are being burning problems for cultivating.

Micro Farming Situations

7 micro farming situations were found throughout the stretched *boro* rice field of Bijra village. The classification and identification of the situations were done by the farmers of the village who have been cultivating on the field for years. They identified the characters of different situations from their experience and accordingly classified the farming situations. Here in the image of the Mouza map, sheet No. 1, the situations are marked with numbers 1-7. The general description of the micro farming situations (MFS) are 1: This part of land is at the south east side of the crop field. A big portion of the land is beside main road of the village. Some homestead area is along this part of field. There is a big pond at the extreme east corner of the field. 2: Throughout the North-East side of the situation 1, micro farming situation 2 is stretched. The east corner of this situation also shares a bank of the big pond. Only at the North-East portion of the situation there are homestead areas. No part of this farming situation is touching the road. 3: At the north side of the 2nd situation there is the micro farming situation area 3. The North and South part of the area there are longer field and

comparatively less stretched fields are on other sides.4: It is situated at the North-West part of land situation 3. A little part of this situation is beside road. Except west the in other 3 sides of this portion is continuous rice field. 5: At the North-West side of situation4, there is situation 5. From the main road, leaving some other crop fields, micro farming situation 5 is situated. In the field, this situation is of triangular shaped. 6: Throughout the North and North-East part of the farming situation 5, micro farming situation 6 is situated. At the North and North-East of this situation there is long stretched rice field. And 7: This is the extreme North-West part of the study area. A portion of the North side of this area is lined with a boundary of orchard garden.

Table 1: Percentage Distribution of plots in 7 Micro Farming Situations on the basis of Herbicides

	No Chemicals	Refit	All Max	Machet	Top Star
MFS 1	75.8	18.2	6.1	0	0
MFS 2	22.2	0	0	40.7	37.0
MFS 3	0	0	38.5	61.5	0
MFS 4	75	25.0	0	0	0
MFS 5	48	0	0	0	52.0
MFS 6	43.5	30.4	26.1	0	0
MFS 7	88.9	0	0	0	11.1
Association between MFSs and Herbicides	Chi-square Test		FET value		0.000

In micro farming situation 1, in 75.8 per cent plots no herbicide was used. In other plots used herbicides were Refit (in 18.2 per cent plots) and All Max (in 6.1 per cent plots). In micro farming situation 2, in 22.2 per cent plots no herbicide was used. In other plots used herbicides were Top Star (in 37 per cent plots) and Machet (in 40.7 per cent plots). In micro farming situation 3, All Max was used in 38.5 per cent plots and Machet was used in 61.5 per cent plots. In micro farming situation 4, in 75 per cent plots no herbicide was used. In other 25 per cent plots used herbicide was Refit. In micro farming situation 5, in 48 per cent plots no herbicide was used. In other 52 per cent plots used herbicide was Top Star. In micro farming situation 6, in 43.5 per cent plots no herbicide was used. In other plots used herbicides were Refit (in 30.4 per cent plots) and All Max (in 26.1 per cent plots). In micro farming

situation 7, in 88.9 per cent plots herbicide was not applied and in rest 11.1 per cent plots Top Star was used. From the data it can be found that only in micro farming situation 3 there is no such plot where herbicide was not applied. Refit was preferred only in some of the plots of situation 1, 4 and 6. All Max was preferred in 5 and 6 though used also in very few numbers of plots of situation 1. Machete was used in highest number of plots; the plots were in situation 2 and 3. Top Star was mainly used in situation 2, 5 and in little number of plots of situation 7. To test the association between Micro farming situation and herbicides Chi-square test was done followed by Fisher's Exact Test. The FET value shows that significant association exists between Micro farming situations and Herbicides.

Table 2: Percentage distribution of plots in 7 Micro Farming Situations on the basis of date of 1st manual weeding

	15-18 DAT	20-25 DAT	30 DAT	40-42 DAT
MFS 1	24.2	51.5	24.2	0
MFS 2	7.4	92.6	0	0
MFS 3	0	61.5	0	38.5
MFS 4	0	75.0	0	25.0
MFS 5	24.0	32.0	24.0	20.0
MFS 6	26.1	26.1	17.4	30.4
MFS 7	11.1	77.8	0	11.1
Association between MFSs and date of 1 st manual weeding	Chi-square Test		FET value	0.000

In micro farming situation 1, in 24.2 per cent plots 1st manual weeding was done in 15-18 DAT. In 51.5 per cent plots in 20-25 per cent DAT and in 24.2 per cent plots on 30 DAT 1st manual weeding was done. In micro farming situation 2, time of 1st manual weeding for different plots were 15-18 DAT for 7.4 per cent plots and 20-25 DAT for 92.6 per cent plots. In micro farming situation 3, in 61.5 per cent plots the time was 20-25 DAT and in 38.5 per cent plots 40-42 DAT. In micro farming situation 4, for 75 per cent plots 20-25 DAT and for 25 per cent plot 40-42 DAT was the time of 1st manual weeding. For micro farming situation 5, in 24 per cent plots it was done in 15-18 DAT, in 32 per cent plots 20-25 DTA, in 24 per cent plots 30 DAT and in 20 per cent plots in 40-42 DAT. For micro farming situation 5, in 26.1 per cent plots it was done in 15-18 DAT, in 26.1

per cent plots 20-25 DTA, in 17.4 per cent plots 30 DAT and in 30.4 per cent plots in 40-42 DAT. In case of micro farming situation 15-18 DAT, 20-25 DAT and 40-42 DAT were dates of 1st manual weeding for 11.1 per cent, 77.8 per cent and 11.1 per cent plots respectively. From the data it can be found that earliest weeding was done in case of some plots of farming situations 1, 2, 5, 6 and 7. In maximum plots throughout the situation weeding was done in the time span of 20-25 DAT. In some of the plots of situations 4, 5, 6 and 7 1st weeding was done at latest time. To test the association between Micro farming situation and date of 1st manual weeding Chi-square test followed by Fisher's Exact Test was done. The FET value shows that significant association exists in between Micro farming situations and date of 1st manual weeding.

Table 3: Percentage distribution of plots in 7 Micro Farming Situations on the basis of date of 2nd manual weeding

	No 2 nd weeding	30-35 DAT	40-45 DAT	50-55 DAT
Mean	0	9.1	45.5	45.5
Mean	40.7	0	22.2	37.0
Mean	76.9	0	23.1	0
Mean	25.0	0	50.0	25.0
Mean	20.0	24.0	32.0	24.0
Mean	30.4	26.1	26.1	17.4
Mean	11.1	11.1	77.8	0
Association between MFSs and date of 2 nd manual weeding	Chi-square Test		FET value	0.000

In micro farming situation 1, time of 2nd manual weeding for 9.1 per cent plots, 45.5 per cent plots and another 45.5 per cent plots were 30-35 DAT, 40-45 DAT and 50-55 DAT respectively. In micro farming situation 2, for 40.7 per cent plots there was no 2nd manual weeding. Time of 2nd manual weeding for 22.2 per cent plots and 37 per cent plots were 40-45 DAT and 50-55 DAT respectively. In micro farming situation 3, for 76.9 per cent plots there was no 2nd manual weeding. Time of 2nd manual weeding for 23.1 per cent plots was 40-45 DAT. In micro farming situation 4, for 25 per cent plots there is no 2nd manual weeding. Time of 2nd manual weeding for 50 per cent plots and 25 per cent plots were 40-45 DAT and 50-55 DAT respectively. In micro farming situation 5, for 20 per cent plots there

was no 2nd manual weeding. Time of 2nd manual weeding for 24 per cent plots, 32 per cent plots and another 24 per cent plots were 30-35 DAT, 40-45 DAT and 50-55 DAT respectively. In micro farming situation 6, for 30.4 per cent plots there was no 2nd manual weeding. Time of 2nd manual weeding for 26.1 per cent plots, 26.1 per cent plots and another 17.4 per cent plots were 30-35 DAT, 40-45 DAT and 50-55 DAT respectively. In micro farming situation 7, for 11.1 per cent plots there was no 2nd manual weeding. Time of 2nd manual weeding for 11.1 per cent plots and 77.8 per cent plots were 30-35 DAT and 40-45 DAT respectively. In most of the plots of micro farming situation 3, almost half of the plots of situation 2, and some of the plots of situations 4, 5, 6 and 7 no 2nd manual weeding was done. It was mostly done in the time 40-45 DAT throughout the entire field. To test the association between Micro farming situation and date of 2nd manual weeding Chi-square test was done followed by Fisher's Exact Test. The FET value shows that significant association is there in between Micro farming situations and date of 2nd manual weeding.

Table 4: Percentage distribution of Date of 1st top dressing in different Micro Farming Situations

	16 DAT	20 DAT	21 DAT	22 DAT	23 DAT	24 DAT	25 DAT	32 DAT
MFS 1	9.1	9.1	63.6	6.1	0	3.0	9.1	0
MFS 2	7.4	7.4	3.7	59.3	0	0	22.2	0
MFS 3	0	0	38.5	23.1	0	38.5	0	0
MFS 4	9.4	0	46.9	25.0	0	3.1	15.6	0
MFS 5	0 (0)	48.0	0	20.0	32.0	0	0	0
MFS 6	0 (0)	26.1	17.4	4.3	21.7	4.3	8.7	17.4
MFS 7	0	11.1	66.7	22.2	0	0	0	0
Association between MFSs and date of 1 st Top dressing of fertilizer.				Chi-square Test	FET value	0.000		

In micro farming situation 1, 1st top dressing of fertilizer was done in 9.1 per cent plots at 16 DAT, 9.1 per cent plots at 20 DAT, 63.6 per cent plots at 21 DAT, 6.1 per cent plots at 22 DAT, 3 per cent plots at 24 DAT and 9.1 per cent plots at 25 DAT. In micro farming situation 2, 1st top dressing of fertilizer was done in 7.4 per cent plots at 16 DAT, 7.4 per cent plots at 20 DAT, 3.7 per cent plots at 21 DAT, 59.3 per cent plots at 22 DAT and 22.2 per cent plots at 25 DAT. In micro

farming situation 3, 1st top dressing of fertilizer was done in 38.5 per cent plots at 21 DAT, 23.1 per cent plots at 22 DAT and 38.5 per cent plots at 24 DAT. In micro farming situation 4, 1st top dressing of fertilizer was done in 9.4 per cent plots at 16 DAT, 46.9 per cent plots at 21 DAT, 25 per cent plots at 22 DAT, 3.1 per cent plots at 24 DAT and 15.6 per cent plots at 25 DAT. In micro farming situation 5, 1st top dressing of fertilizer was done in 48 per cent plots at 20 DAT, 20 per cent plots at 22 DAT and 32 per cent plots at 23 DAT. In micro farming situation 6, 1st top dressing of fertilizer was done in 26.1 per cent plots at 20 DAT, 17.4 per cent plots at 21 DAT, 4.3 per cent plots at 22 DAT, 21.7 per cent plots at 23 DAT, 4.3 per cent plots at 24 DAT and 8.7 per cent plots at 25 DAT and 17.4 per cent plots at 32 DAT. In micro farming situation 7, 1st top dressing of fertilizer was done in 11.1 per cent plots at 20 DAT, 66.7 per cent plots at 21 DAT and 22.2 per cent plots at 22 DAT. From the data it can be observed that earliest top dressing of fertilizer was done in very few numbers of plots of the situations 1, 2 and 4. In most of the plots top dressing was done on 21-22 DAT. In few numbers of plots in situation 6, it was done on latest date, 32 DAT. To test the association between Micro farming situation and date of 1st top dressing of fertilizer Chi-square test was done followed by Fisher's Exact Test. The FET value shows that significant association exists in between Micro farming situations and date of 1st top dressing.

Table 5: Percentage distribution of plots in 7 Micro Farming Situations on the basis of date of 2nd top dressing

	37 DAT	40 DAT	42 DAT	44 DAT	45 DAT	51 DAT	52 DAT	55 DAT
MFS 1	9.1	36.4	6.1	0	30.3	18.2	0	0
MFS 2	51.9	14.8	3.7	0	7.4	0	0	22.2
MFS 3	38.5	0	23.1	0	38.5	0	0	0
MFS 4	0	9.4	56.2	3.1	0	0	15.6	15.6
MFS 5	0	48.0	32.0	0	20.0	0	0	0
MFS 6	0	26.1	30.4	0	26.1	0	0	17.4
MFS 7	0	11.1	77.8	0	11.1	0	0	0
Association between MFSs and date of 2 nd Top dressing of fertilizer.				Chi-square Test	FET value	0.000		

In micro farming situation 1, 2nd top dressing was done in 9.1 per cent plots at 37 DAT, 36.4

per cent plots at 40 DAT, 6.1 per cent plots at 42 DAT, 30.3 per cent plots at 45 DAT and 18.2 per cent plots at 51 DAT. In micro farming situation 2, 2nd top dressing was done in 51.9 per cent plots at 37 DAT, 14.8 per cent plots at 40 DAT, 3.7 per cent plots at 42 DAT, 7.4 per cent plots at 45 DAT and 22.2 per cent plots at 55 DAT. In micro farming situation 3, 2nd top dressing was done in 38.5 per cent plots at 37 DAT, 23.1 per cent plots at 42 DAT and 38.5 per cent plots at 45 DAT. In micro farming situation 4, 2nd top dressing was done in 9.4 per cent plots at 40 DAT, 56.2 per cent plots at 42 DAT, 3.1 per cent plots at 44 DAT, 15.6 per cent plots at 52 DAT and 15.6 per cent plots at 55 DAT. In micro farming situation 5, 2nd top dressing was done in 48 per cent plots at 40 DAT, 32 per cent plots at 42 DAT and 20 per cent plots at 45 DAT. In micro farming situation 6, 2nd top dressing was done in 26.1 per cent plots at 40 DAT, 30.4 per cent plots at 42 DAT, 26.1 per cent plots at 45 DAT and 17.4 per cent plots at 55 DAT. In micro farming situation 7, 2nd top dressing was done in 11.1 per cent plots at 40 DAT, 77.8 per cent plots at 42 DAT and 11.1 per cent plots at 45 DAT. From the data it can be observed that in many plots of farming situations 1, 2 and 3- 2nd top dressing was done earlier. In few plots of the situation 2, 4 and 6- it was done much later. In most of the plots it was done in 40-42 DAT. To test the association between Micro farming situation and date of 2nd top dressing of fertilizer Chi-square test was done followed by Fisher's Exact Test. The FET value shows that significant association exists in between Micro farming situations and date of 2nd top dressing.

Table 6: Distribution of plots in 7 Micro Farming Situations on the basis of date of 3rd top dressing

	No top dressing	52 DAT	54 DAT	55 DAT	57DAT
MFS 1	90.9	9.1	0	0	0
MFS 2	100.0	0	0	0	0
MFS 3	100.0	0	0	0	0
MFS 4	100.0	0	0	0	0
MFS 5	8.0	0	24.0	68.0	0
MFS 6	73.9	0	0	26.1	0
MFS 7	0	0	0	88.9	11.1
Association between MFSs and date of 3 rd Top dressing of fertilizer.		Chi-square Test		FET value	0.000

In micro farming situation 1, in 90.9 per cent plots 3rd top dressing was not done. Only in 9.1 per cent plots it was done on 52 DAT. In situation 2, 3 and 4 3rd top dressing was not done. In micro farming situation 5, in 8 per cent plots 3rd top dressing was not done. In 24 per cent plots it was done on 54 DAT and in 68 per cent plots it was done on 55 DAT. In micro farming situation 6, in most of the plots (73.9 per cent) 3rd top dressing was not done. Only in 26.1 per cent plots it was done on 55 DAT. In micro farming situation 7, in all plots 3rd top dressing was done. In 88.9 per cent plots it was done on 55 DAT and in 11.1 per cent plots it was done on 57 DAT. From the data it can be observed that in situation 2, 3 and 4 no 3rd top dressing was given. All the plots in situation 7 needed 3rd top dressing of Nitrogen at high dose. To test the association between Micro farming situation and date of 2nd top dressing of fertilizer Chi-square test was done followed by Fisher's Exact Test. The FET value shows that significant association exists between Micro farming situations and date of 3rd top dressing.

Table 7: Comparative Study of 7 Micro Farming Situations on the basis of total amount of top dressed fertilizers

Practice	MFS							f	Sig.
	1	2	3	4	5	6	7		
	Mean	Mean	Mean	Mean	Mean	Mean	Mean		
Top dress total N	93.61	95.11	70.23	97.83	113.38	89.93	87.50	9.032	0.000
Top dress total P	20.33	16.62	7.38	20.25	17.32	18.78	4.89	12.266	0.000
Top dress total K	39.27	44.63	27.69	9.74	23.81	26.34	15.91	17.239	0.000

From the table 7 it is observed that highest amount of Nitrogen was applied by 2 or 3 top dressings in micro farming situation 5. The lowest amount of Nitrogen was applied in situation 3. Phosphorus was applied in higher amount in farming situation 1 and 4 which was low in case of situation 3. Application of Potassium fertilizer was highest in situation 2 and lowest in situation 4. To test whether the association between micro farming situation and amount of fertilizer application during top dressing is significant or not, ANOVA was done. The result shows that significant association exists in between micro

farming situations and amount of top dressed fertilizer.

CONCLUSION

'Blanket' type recommendations are likely to have very limited value. Much wider adoption is likely to occur, if a number of options are offered to farmers and the recommendations are tied more closely to the farmers' own production environment. Farmers' classification of micro farming situations may be a way to identify the farmers' own production environments. Farmers' indigenous knowledge is the support behind the logic of this kind of classifications. Testing the validation of this classification shows the efficiency of farmers' indigenous knowledge. So, the present study on Farmers' Classification and Validation of Participatory Farming System Identification may play an important role in Farming System Research. In this study the farmers of the Bijra village classified the continuous *boro* rice field of their area into 7 micro farming situations. The detail information about the cultivation practices done over 162 sample plots from the 7 micro farming situation was statistically analyzed and it was found that significant association exists between micro farming situation and all the cultivation practices. Keeping the crop and varietal duration constant, it has been found that selection of varieties, time of sowing, seed rate, fertilizer type for seed bed and main bed, amount of fertilizer in seed bed and main bed, pesticides used, age of seedlings while transplanting, dates of transplanting, top dressing of fertilizer, weeding, weeding technology, irrigation, time of harvesting and yield varies with land elevation, fertility status, water holding capacity, cropping intensity, irrigation, soil type, productivity, slope, pH and submergence of land. Based on these characteristics farmers classified the micro farming situations. The weed diversity of the situations was of different type both in respect of number of weed species and number of weeds. Also the cost of the lands in different situations varied. These validate the farmers' classification and conclude that their indigenous knowledge is subjective and they are efficient in modifying their cultivation technologies in their own cultivation

environment. While carrying the new and developed technologies to the farmers, extension scientists and extension workers should be aware of the Recommendation Domain and be careful about the particular situation. Similar micro farming situation may exist in locality. The micro farming situation, in this sense, is determinant of a recommendation domain; where a technology or research outcome can successfully be diffused (or decided to be adopted). The decision making of farmers and researchers or policy makers, hence, has to get a common interface in the face of this crisis. Otherwise the researches drawing on huge fund and time are going to be non-functional or even aborted and another group of scientists/researchers will go on to find out the correlation between non-adoption of a technology and farmers ignorance/resistance to change.

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