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Introduction

New alluvial zone of eastern India is characterized with high intensity agriculture which in turn is both coercive and depletive by nature. High intensity mechanization, as it is becoming exponentially popular due to lack of agricultural labourers associated with unaffordable wage, is ushering soil erosions and declining organic carbon level. The social ecology of this zone is predominant by farmers who are mostly owner of small, marginal and fragmented holdings. This has further made the tiny holdings energy prodigal and economically non-manageable.



Decades	Paddy yield in kg/ bigha(.13 ha) in New Alluvial zone	No. of livestock/ household in New Alluvial zone
1975-1990	880-960	25-26
1991-2005	800-840	10-12
2006-2020	640-720	0-4

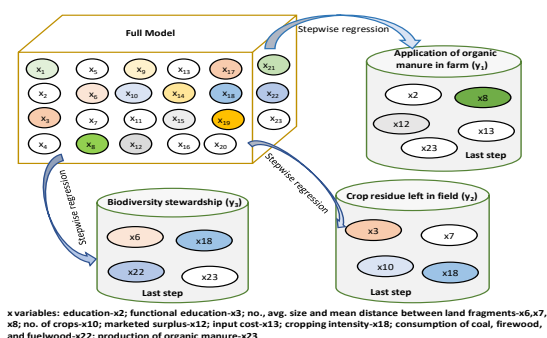


Figure 1. Stepwise Regression Analysis (y_1 , y_2 , and y_3 vs. 23 causal variables)

The present study was conducted on 100 farmers, small and marginal farmers in five selected focussed group discussion locales using both participatory and non-participatory methods. A structured schedule has been administered to generate responses against a shade of queries. Ecological resilience has been estimated by using Participatory Rural Appraisal (PRA) technique of time trend analysis to elucidate the pattern of changes of main crop (here paddy) yield and number of livestock per household over a time period of last 30 years in 3 decadal cohorts.

The slope, role, function, and contribution (i. e. ecological resilience in conservation agriculture farms) of the socio- personal (viz. age, education, family size, and communication status), and agro- ecological- economic (viz. holding size, no., size and mean distance between land fragments, no. of crops, crop yield, marketed surplus, cropping intensity, irrigated land area, consumption of coal, firewood, and fuelwood, input cost, livestock count, and production of organic manure, annual on- farm income and family expenses) factors and their relations with application of organic manure in farm (y_1), crop residue management (y_2), and biodiversity stewardship (y_3) are delineated through relational analysis (here Stepwise Regression). The present study offers huge micro sociological policy in dealing with diverse issues of conservation agriculture towards attaining sustainability and productivity through socializing conservation agriculture across the small and marginal land holders in new alluvial zone of eastern India.

Revelation from the study

I) Time Trend Analysis: From table. 1, it can be said according to the farmers' point of view, that paddy yield has decreased from the range of 880-960, 800-840 to 640-720 kg/ bigha (.13ha) in new alluvial zone, in these three cohorts of total 45 years. It is also found that farmers are following same cropping system over the years with almost no or little legume crop insertion, repetitive tillage on same piece of lands. This is also elucidated that the number of livestock per household in the study villages of new alluvial zone was almost 25-26 in the years of 1975-1900; however, the number is gradually declined to 10-12 from 1901 to 2005, in this cohort of 15 years. At present there are up to 4 numbers of livestock are seen in the farm households, maximum pose no livestock currently. According to the villagers, high rise in the feed cost and low price of milk that are sold to middlemen are declining livestock numbers gradually. Although, in the fields are fodder crops also, which is new introduction in some villages. Thus, it may be possible for the farmers to leave some of their crop residues in their agricultural field either for mulching or can maintain a proper crop stubble height.

III) Relational Analysis: Application of organic manure in farm (y_1) is substantially impacted by household production of organic manure, input cost, education, marketed surplus, mean distance between fragments. The farmers having much of marketed surplus and education are more tilted for conservation agriculture and adding more organic manure to their farms. The functional relation has been explained to the tune of 54.30 per cent. The model depicts that to augment better crop residue management (y_2), the critical determinants are; production of household organic manure, consumption of fuel wood, fire woods, no of land fragments, cropping intensity and livestock count. The functional relation has been interpreted to 84.50 per cent level. The biodiversity stewardship (y_3) functions catered by the CA farmers are being functionally and substantially impacted the following traits of farmer respondents viz.. Functional education, size of single fragment, cropping intensity and count of crops cultivated. The functional relation has been interpreted to the level of 63.40 per cent. The small and fragmented farm realities in conservation agriculture of new alluvial agro-climatic perspectives invite the attention of conservation agriculturists on these determinants (depicted in figure. 1).

Key conclusion

A good number of farmers are quite interested in CA farming, perception is growing up day by day and they found it as a promising farming practice, maintaining a certain height of crop stubble at their field, using solar pumps collectively, and reducing the number of tillage in the study areas of New Alluvial zone. Hence, this study will be helpful in finding out some of the most important areas of intervention related to CA at farmers' level in the state of West Bengal with a goal to protect and preserve precious natural resources, stabilization and augmentation of food production and livelihood for millions.