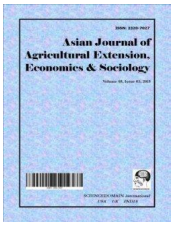

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# Socio-economic Characteristics of the Adopters and Non-adopters of Inter-cropping in Areca Nut Plantation in Ri-Bhoi District of Meghalaya

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***Authors' contributions***

*This work was carried out in collaboration among all authors. Author DS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors DS and SHM managed the analyses of the study. Author DS managed the literature searches. All authors read and approved the final manuscript.*

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## ABSTRACT

The socio-economic status of farmers plays a vital role in Agriculture. It is observed from the present study that the farmers economic level affect the livelihood of the farmers in Ri-Bhoi District of Meghalaya. The farmers have tried to change their way of cropping by introducing inter-crops with the main crops to increase their income level. The purposed of this finding was to compare the difference in the socio-economic characteristics of the adopter and non-adopter of inter-cropping in areca nut plantation in Ri-Bhoi District of Meghalaya. Ri-Bhoi district of Meghalaya is therefore selected for the study. Since time immemorial, areca nut has been grown in Meghalaya as an important commercial crop. Ex-Post Facto research design was used for this study. The sample study was selected through multistage sampling method in the selected study area of the respondents. Number of respondents was selected using a simple random method based on the criteria of practicing areca nut plantation and those who practiced both areca nut plus inter-cropping. A survey of 310 adopters and 310 non-adopters of intercropping in areca nut plantation were selected for the study. Collection of primary data was done by interview schedule and

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appropriate statistical tools were used for interpretation of the data. Independent variables included in this were gender, age, marital status, educational level, type of house, family size, family type, social category, annual income, information seeking behaviour, participation in extension activities, social participation, innovativeness, scientific orientation, economic motivation and risk orientation. Based on the study it is observed there are few variables contributing to the significant difference between the adopters and the non-adopters in related to their socio-economic characteristics.

*Keywords: Areca nut; inter-cropping; adopters; non-adopter; socio-economic.*

## 1. INTRODUCTION

The areca nut is the fruit of the areca palm (*Areca catechu*), which grows in much of the tropical Pacific (Melanesia and Micronesia), Southeast and South Asia, and parts of east Africa. This fruit is commonly referred to as betel nut. Inter-cropping is growing of annuals or biennials in the inter space of main crop. Eg Turmeric, ginger, elephant foot yam, tapioca, sweet potato etc. are grown in areca based inter-cropping systems. Multiple cropping has been practiced for centuries by small-scale farmers to reduce the risk of crop failure, attain higher yields, and to improve soil fertility (Litsinger and Moody, 1976) [1]. Areca nut is the major source of livelihood for small and marginal farmers in Ri-Bhoi District of Meghalaya. Most of the farmers depend on the income from areca nut due to its ability to thrive well in this area. The finding of this study will help to understand the impact of inter-cropping in areca nut plantation on socio-economic changes among the adopters in Ri-Bhoi district. It will provide useful guidance, information and understanding the usefulness of inter-cropping practices in areca nut plantation. It will also help them to know the beneficial uses of inter-cropping in areca nut.

### 1.1 Objectives

To ascertain and compare between adopters and non-adopters regarding their socio-economic characteristics.

### 1.2 Hypothesis

The null hypothesis was formulated between the adopters and non-adopters socio-economic characteristics.

$H_0$= There is no significant difference between the adopters and non-adopter in regarding their socio-economic characteristics.

### 1.3 Review of Literatures

Adesope et al., (2012) [2] found out that 34.4% of the farmers were male, while 65.6% were female.. Also, 14.4% of the farmers were between the ages of 31and 40 years old, 36.7% were between 41 and 50 years, 26.7% were between 51 and 60 years, while 22.2% were 61 years and above. Agarwal & Singh (2014) [3] found out in their study that out of the total sample size of soybean growers which was 40. Large numbers of farmers were highest and it contributed about 37.50 per cent to total sample size. The number of medium and small farmers was 35.00 and 27.50 per cent respectively. Only 5 percent farmers was illiterate and rest of the farmers i.e. 95 per cent was literate. Percentage of the farmers who did intermediate was highest in case of small and medium farmers. Number of respondents who did graduate was highest in case of large farmers i.e. 6.The average family size on overall sampled farm families was worked out to be 7.71. The average number of family members was largest in medium farms (8.06) followed by large (8.00) and lowest on small farms i.e. 7.08 The contribution of old age group (> 50 years) which is an indicator of farming experience, was highest in case of small farmers (21.75 per cent) followed by medium farmers (20.15 percent) and lowest for large farmers (16.69 per cent). The middle age group (18-50 years) was considered as main work force on the farm. Out of total family members, the contribution of this group was 42.37, 40.69 and 40.00 percent for small, medium and large farmers, respectively. Sharma et al. (2015) [4] revealed that more than sixty per cent (63.33%) of respondents were having small family size with less than five members and remaining were having large family size with more than five members. Singh et al., (2016) [5] concluded in their study that only 33.9% of the farmers from the study area were poor. Most of the farmers who have more number of family members are below the poverty line. This is due to the fact that the farmers are unable to meet the requirement of their family members. Modirwa (2019) [6] suggested that the fact that the majority of the respondents are married may imply that couples are engaged in a cooperative effort in farming activities. The majority (38%) went up to high school level. The majority of the

sampled farmers 43% had up to five years of farming experience. The study found that 59% of the farmers have land of about 5 hectares. Kimani et al., (2019) [7] found out in their study that majority of the respondents were smallholder farmers i.e.; 58 percent possessed less than one acre of land, 38 percent owning between 1 to 5 acres with only 5 percent having more than 5 acres. Female farmers formed the majority of the respondents in the study area at 60 percent. The farming activities majorly involved middle-aged and elderly farmers where 69 and 11 percent were found to be in the 36-64 and over 65 years age brackets respectively, while only 20 percent fell under the youth category of 18-35 years.

## 2. METHODOLOGY

The present study was conducted in purposively selected district Ri-Bhoi of Meghalaya where practicing areca nut plantation prevails in large numbers. Further, out of the three blocks in Ri-bhoi district, Jirang block was selected purposively thereafter 12 villages and 620 respondents was selected through simple random sampling. An Ex-Post facto research design was used for this study. With the help of an ex-post facto research, the researcher tries to analyse the cause and effect phenomena of an event, action or behaviour which is appropriate for studying the impact of inter-cropping on the socio-economic changes among adopters of the areca nut growers in Ri-bhoi district, since this event had already occurred. The data was gathered using pre-tested and semi-structured interview schedule. Collected data were analysed by the application of suitable statistical tools and draw the inference there after.

## 3. RESULTS AND DISCUSSION

### 3.1 Socio-economic Characteristics of the Adopters and the Non-adopters

The Table below showed that majority of the respondents (95.16 per cent) and 98.38 per cent of the adopters and non -adopters were male. Majority of the respondents accounted for 60.64 per cent and 62.58 per cent of the adopters and non -adopters were found in middle age group. Majority of the respondents accounted for 94.19 per cent and 94.84 per cent of the adopters and non -adopters were found to have been married. 39.35 per cent and 46.12per cent of adopters and non-adopters were literate.57.41 per cent and 51.94 per cent of adopters and non-adopters were having cemented house. Majority of the adopters accounted for 69.03 per cent and 76.45 per cent non-adopters were having large size family. Majority of the adopters accounted for 82.90 per cent and 83.87 per cent non-adopters were having joint family type. Majority of the adopters accounted for 96.45 per cent and 93.87 per cent non-adopters were Scheduled tribe. Majority of the adopters accounted for 85.48 per cent and 75.48 per cent non-adopters were practicing agriculture as their occupation.45.48 per cent of the adopters had income above Rs.1, 00,000/- and 69.35 per cent of the non-adopters earned annually only up to Rs 50,000/-.Most of the adopters (38.06 per cent) are having medium level of seeking information behaviour and majority of the non-adopters (45.16 per cent) are having a low level of information seeking behaviour. The reason behind this is that most of them are not interested and feel that they need to know the information as they are not going to change their farming practices. Majority (60.00 per cent) of the adopters had medium level of participating in extension activities and 71.94 per cent of the non-adopters had low level of participating in extension activities. The reason that the non-adopters had low level of participation in extension activities is due to the distance of the extension office.54.42 per cent and 52.25 of adopters and non-adopters had medium level of social participation. 76.67 per cent of the adopters had high level of Innovativeness whereas 66.12 per cent of the adopters had medium level of Innovativeness. Majority of the adopters (80.33 per cent) are highly and economically motivated in taking up the inter-cropping. Whereas, majority of the non-adopters (90.32 per cent) are low in economic motivation towards inter-cropping. Majority (58.39 per cent) are of high level of scientific orientation and majority of the non-adopters (73.87 per cent) are of medium level of scientific orientation. Majority (83.87 per cent) of the adopters are having a high level of risk orientation is that it might be due to truthful information, assured assistances, and surety to get success in their present enterprises that makes them developed in the risk taking behaviour. While the non-adopters are still in the process of developing their enterprise by trying to take risk after the success of the majority. Similar findings were observed by Kumaran et al., (2018) [8] showed in their result about socio-economic characteristics of the farmers that the majority were male (97.77 per cent) and only few were female (2.23 per cent)In case of age, the majority of the traditional (58%) and scientific (76%) farmers of West Bengal were belonged to 31-45

years. Contrarily, half of scientific (54%) and traditional (49%) farmers of Kerala (KL) were in the age group of 46-60 years. Jaganathan & Nagaraja (2015) [9] also showed in their findings that majority (63.3%) of the respondents were in middle age group (35-60 years) followed by 28.9 per cent belonged to young age group and only 7.8 per cent in old age category. The average age of the respondents was 42.3 years which led to a conclusion in their research that middle age farmers opt for areca nut cultivation as their profession. Educational status of the respondents varies from illiterate to post graduate with a mean score of 2.2. Majority of areca nut growers (60%) are confined to a secondary education followed by higher secondary (17.8%). They stated that an educated individual is likely to be more receptive to modern technologies in cropping system because education empowers individuals in terms of decision making, problem solving and change proneness**.** Other similar findings of Muyengi et al. (2015) [10] and Aniedu (2016)[11] were also alike with the research study.

**Table 1. Socio-economic characteristics of the adopters and non-adopters**

| Sr. no. | Category | Adopters | | Non-adopters | |
|---|---|---|---|---|---|
| | | F | % | F | % |
| **I** | **Gender** | | | | |
| 1. | Male | 295 | 95.16 | 305 | 98.38 |
| 2. | Female | 15 | 4.84 | 5 | 1.62 |
| **II** | **Age** | | | | |
| 1. | Young age group (25to 35 years) | 81 | 26.13 | 85 | 27.42 |
| 2. | Middle age group (between 36 to 50 years) | 188 | 60.64 | 194 | 62.58 |
| 3. | Old age group(above 50 years) | 41 | 13.23 | 31 | 10.00 |
| **III** | **Marital status** | | | | |
| 1. | Unmarried | 7 | 2.25 | 9 | 2.90 |
| 2. | Married | 292 | 94.19 | 294 | 94.84 |
| 3. | Widower/Widow | 8 | 2.59 | 5 | 1.62 |
| 4. | Separated | 3 | 0.97 | 2 | 0.64 |
| **IV** | **Education** | | | | |
| 1. | Illiterates | 62 | 20.00 | 86 | 27.75 |
| 2. | Neo-literate | 6 | 1.93 | 3 | 0.97 |
| 3. | Literate (can read & write) | 122 | 39.35 | 143 | 46.12 |
| 4. | Primary ($1^{st}$ to $7^{th}$ standard) | 43 | 13.88 | 36 | 11.62 |
| 5. | Upper Primary ($8^{th}$ to $10^{th}$ standard) | 49 | 15.80 | 18 | 5.81 |
| 6. | Higher secondary($11^{th}$ to $12^{th}$ standard) | 24 | 7.75 | 15 | 4.83 |
| 7. | Graduate and above | 4 | 1.29 | 9 | 2.90 |
| **V** | **Type of house** | | | | |
| 1. | Cemented | 178 | 57.41 | 161 | 51.94 |
| 2. | Semi-cemented | 89 | 28.71 | 96 | 30.97 |
| 3. | Hut | 43 | 13.88 | 53 | 17.09 |
| **VI** | **Family size** | | | | |
| 1. | Small size (Less than 5 members) | 96 | 30.97 | 73 | 23.54 |
| 2. | Large size (above 5 members) | 214 | 69.03 | 237 | 76.45 |
| **VII** | **Family type** | | | | |
| 1. | Conjugal | 35 | 11.30 | 31 | 10.00 |
| 2. | Joint | 257 | 82.90 | 260 | 83.87 |
| 3. | Extended | 18 | 5.80 | 19 | 6.13 |
| **VIII** | **Social category of the member** | | | | |
| 1. | Only Agriculture | 265 | 85.48 | 234 | 75.48 |
| 2. | Agriculture plus in-service | 33 | 10.64 | 40 | 12.90 |
| 3. | Agriculture plus any other | 12 | 3.88 | 36 | 11.62 |
| **IX** | **Occupation** | | | | |
| 1. | Small farmer (<1ha) | 56 | 18.06 | 160 | 51.62 |
| 2. | Medium farmer (2.01 to 3h) | 226 | 72.90 | 136 | 43.87 |
| 3. | Big farmer ( >3 ha) | 28 | 9.03 | 14 | 4.51 |

| | | | | | |
|---|---|---|---|---|---|
| **X** | **Size of land holding** | | | | |
| 1. | Low (up to Rs. 50,000/-) | 67 | 21.61 | 215 | 69.35 |
| 2. | Medium (Rs. 50,000 to 1,00,000/-) | 102 | 32.90 | 59 | 19.03 |
| 3. | High (Above Rs. 1,00,000/-) | 141 | 45.48 | 36 | 11.62 |
| **XI** | **Information seeking behaviour** | | | | |
| 1. | Low contact (26-39) | 78 | 25.17 | 140 | 45.16 |
| 2. | Medium contact (40-65) | 118 | 38.06 | 111 | 35.80 |
| 3. | High contact (66-78)) | 114 | 36.77 | 59 | 19.04 |
| **XII** | **Participation in extension activities** | | | | |
| 1. | Low contact (6-9) | 74 | 23.87 | 223 | 71.94 |
| 2. | Medium contact (10-14) | 186 | 60.00 | 76 | 24.51 |
| 3. | High contact (15-18) | 50 | 16.13 | 11 | 3.55 |
| **XIII** | **Social participation** | | | | |
| 1. | Low ( 0 to 5 Score) | 10 | 3.23 | 28 | 9.04 |
| 2. | Medium (6 to 10 Score) | 169 | 54.52 | 162 | 52.25 |
| 3. | High ( 11 to 15 Score) | 131 | 42.25 | 120 | 38.71 |
| **XIV** | **Innovativeness** | | | | |
| 1. | Low ( 0 to 5 Score) | 4 | 1.30 | 88 | 28.39 |
| 2. | Medium (6 to 10 Score) | 59 | 19.03 | 205 | 66.12 |
| 3. | High ( 11 to 15 Score) | 247 | 76.67 | 17 | 5.49 |
| **XV** | **Economic motivation** | | | | |
| 1. | Low (8 to 14 Score ) | 7 | 2.26 | 280 | 90.32 |
| 2. | Medium (15 to 21 Score) | 54 | 17.41 | 28 | 9.03 |
| 3. | High ( 22 to 27 Score) | 249 | 80.33 | 2 | 0.65 |
| **XVI** | **Scientific orientation** | | | | |
| 1. | Low (0 to 8) | 10 | 3.23 | 57 | 18.38 |
| 2. | Medium (9 to 16 Score) | 119 | 38.38 | 229 | 73.87 |
| 3. | High ( 17 to 24 Score) | 181 | 58.39 | 24 | 7.75 |
| **XVII** | **Risk orientation** | | | | |
| 1. | Lower level of risk orientation (7 to 16 score) | 5 | 1.62 | 12 | 3.88 |
| 2. | Medium level of risk orientation(17 to 25 score) | 45 | 14.51 | 182 | 58.71 |
| 3. | Higher level of risk orientation(26 to 35score) | 260 | 83.87 | 116 | 37.41 |

*F=Frequency, %=Percentage*

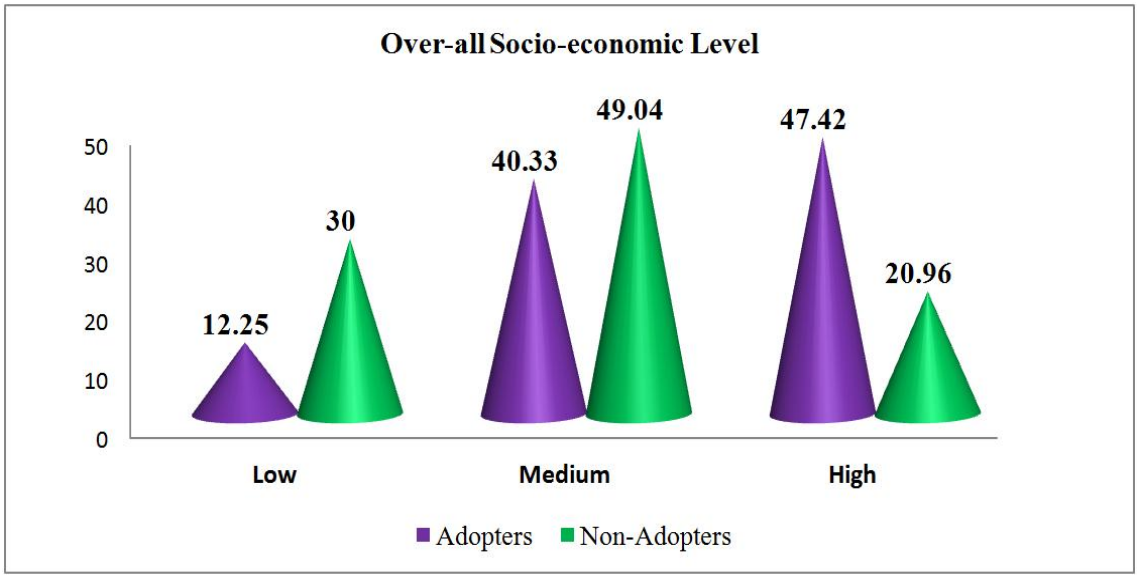


**Fig 1. Over-all socio-economic characteristics level of the adopters and the non-adopters**

**Table 2. Over-all socio-economic characteristics level of the adopters and the non-adopters**

| Sr. no. | Category | Adopters | | Non-adopters | |
|---|---|---|---|---|---|
| | | Frequency | Percentage | Frequency | Percentage |
| 1. | Low (18 to 45 Score) | 38 | 12.25 | 93 | 30.00 |
| 2. | Medium (46 to 73 Score) | 125 | 40.33 | 152 | 49.04 |
| 3. | High (74 to 103 Score) | 147 | 47.42 | 65 | 20.96 |
| **Total** | | **310** | **100.00** | **310** | **100.00** |

**Table 3.Significant difference between the socio-economic characteristics level of the adopters and the non-adopters**

| | Variable 1 | Variable 2 |
|---|---|---|
| Mean | 103.3333 | 103.3333 |
| Variance | 3322.333 | 1972.333 |
| Observations | 3 | 3 |
| Hypothesized Mean Difference | 0 | |
| df | 4 | |
| t Stat | 0 | |
| P(T<=t) one-tail | 0.5 | |
| t Critical one-tail | 2.131847 | |
| P(T<=t) two-tail | 1 | |
| t Critical two-tail | 2.776445 | |

### 3.2 Over- all Socio-economic Characteristics Level of the Adopters and the Non-adopters

From the Table and Fig it is revealed that the majority of the adopters accounted for 47.42 per cent are having high socio-economic characteristics, followed by 40.33 per cent of medium level and 12.25 per cent that of low level characteristics. The non-adopters in contrarily depicted that 49.04 per cent are of medium level, followed by 30.00 that of low level and 20.96 per cent who are in the high level socio-economic characteristics. The findings were also corroborated those of Oto & Shimayohol (2011) [12].

### 3.3 Significant Difference between the Socio-economic Characteristics Level of the Adopters and the Non-adopters

From the above table it is depicted that the calculated value is greater than the table value which denoted the rejected of the null hypothesis and acceptation of the alternate hypothesis that there is a significant difference between the socio-economic characteristics of the adopters and non-adopters at 1 per cent and 5 per cent level of significance

## 4. CONCLUSION

It is therefore concluded based on the findings that the socio-economic levels of the adopters were high as compare to the non-adopters. The non-adopters are having medium level socio-economic. The adopters and non-adopters were found to have similarity in the independent variables like gender, age, educational status, type of house, family size, and type of family, social category, occupation and social participation which does not have any effect on the socio-economic level. Whereas, the other independent variables like size of land holdings, annual income, information seeking behaviour, level of participation in extension activities, level of innovativeness, economic motivation, scientific orientation and risk orientation were found to have been difference between the adopters and non-adopters. These differences have significantly contributed to the socio-economic changes among the adopters and the non-adopters of intercropping in areca nut plantation in Ri-Bhoi district of Meghalaya. If there will be changes in these variables the socio-economic level of the non-adopters will also change extemporaneously. It can be suggested that the non-adopters should start to adopt the practice of inter-cropping especially due to the prolong bearing of the areca nut and sometimes its failures due to the attack of pests and diseases in such cases inter-cropping is a good alternative to support the socio-economic conditions of the farmers.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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