

## Post-frontline demonstration impact analysis of open sea cage culture among *Sidi* tribes in Gujarat

P. S. SWATHI LEKSHMI, C. RAMACHANDRAN, R. NARAYANA KUMAR, K. MOHAMMED KOYA, K. R. SREENATH, GYANARANJAN DASH, SWATI PRIYANKA SEN, SURESH KUMAR MOJJADA, B. SANGEETHA, P. MAKWANA NAYAN AND G. SYDA RAO

Central Marine Fisheries Research Institute, Kochi - 682 018, Kerala, India  
e-mail: swathi.lekshmi263@gmail.com

### ABSTRACT

Front line demonstrations (FLD) evolved by the Indian Council of Agricultural Research are conducted under the close supervision of scientists of the National Agriculture Research System, where in technologies are demonstrated for the first time by the scientists themselves before being fed in to the main extension system of the state machinery. Post-front line demonstration impact analysis on open sea cage culture of finfishes and lobsters, among *Sidi* tribes of Gujarat aimed at assessing the socio-personal, socio-psychological and socio-economic and behavioural characteristics of *Sidis* - a primitive tribal group who are the beneficiaries of the open sea cage culture programme of the Central Marine Fisheries Research Institute (CMFRI) under the Tribal Sub-Plan (TSP) of the Government of India. Using multistage random sampling method, a sample of 135 *Sidi* tribals were selected from Veraval and Talala taluks in Junagadh District of Gujarat. The group consisted of 45 *Sidis* practising cage culture, 45 non-practising beneficiaries of the tribal society and 45 *Sidis* who were non-practising non-beneficiaries of the society. The findings of the study revealed that most of the participant beneficiaries (58.33%) were having high school level of education, compared to non-participant beneficiaries, most of whom were illiterates (55.55%). It could be inferred that, the participant beneficiaries had a higher average monthly income of ₹ 1,216.25 when compared to non-participant beneficiaries who earned an average monthly income of ₹ 854.25. Among the participant beneficiaries, 41.67% had medium level of knowledge in cage culture, 50% had medium level of attitude and 75% had medium level of perceived skill in cage culture technologies.

Keywords: FLD, Front line demonstration, *Sidi* tribe, Open sea cage culture, Socio-economic conditions

### Introduction

*Sidis* are a very ancient tribal community in India whose genetic roots can be traced back to the African sub-continent (Shah *et al.*, 2011). History records that, these tribes were brought to India way back in 997 AD as soldiers to work in the army of "Mahmud of Ghazni", the most prominent ruler of the Ghaznavid Empire who conquered and plundered the north-western Indian subcontinent. Thereafter, the major influx of *Sidis* to India occurred during the 17<sup>th</sup> to 19<sup>th</sup> centuries, when the Portuguese brought them as slaves to India. Characterised by a strong physiognomy, unique to this race, they were the most sought after, to engage in hard and laborious tasks which demanded physical energy to a great extent. It is interesting to note that the first Anglo-Indian war (also known as Child's war), waged between Mughal Empire and the British in 1689, was led by a *Sidi* commandant named Sidi Yakub (Keay, 2000).

Considered a lost African tribe (Basu, 1998) their descendants later dispersed to the states of Gujarat,

Karnataka and Andhra Pradesh. Rough estimates put their present population at around 20,000-30,000 spread over the states of Andhra Pradesh, Gujarat, Karnataka and Maharashtra. Currently majority of *Sidis* reside in Gujarat, largely on the periphery of the Gir Forest (Aga Khan Foundation, 2008). The term *Sidi* is derived either from *Sayyid*, a title used in Arabic, originally to denote someone in the lineage of the Prophet Muhammad (possibly with reference to the Arab captains referred to those who initially brought Africans to Iran/Pakistan), or from the Arabic *Saydi*, meaning captive or prisoner of war. The present study deals with the socio-economic background of "*Sidi Badshahs*" of Junagadh District of Gujarat.

*Sidis* of Gujarat today make a living as farmers, labourers, rickshaw pullers, auto drivers and workers in fishing vessels. Their women folk are engaged as farm labourers, firewood gatherers and sellers and also as domestic help in the houses of well to do people from other communities. These occupations provide *Sidis* a very meager income which is often erratic, seasonal and

unsustainable in the long run. Known for their diving skills and sea endurance, *Sidis* are not alien to fishing related enterprises. But they being traditionally forest dwellers endure a marginalised occupational niche in the coastal urban space where they have recently migrated seeking alternative jobs. Landlessness coupled with weak capital endowment has aggravated their survival options. It is in this context that, open sea cage culture technology was identified as a potential alternative livelihood option for *Sidi* tribes to be promoted under the Tribal Sub Plan Project (TSP) of the Government of India in December, 2011 by the Central Marine Fisheries Research Institute (CMFRI), Kochi. The *Sidis* of six districts in Rajkot Division of Saurashtra have been designated as Scheduled Tribe (ST) since 1956, there by bringing various benefits in the form of financial assistance and reservation in educational institutions and government jobs. CMFRI came forward with a proposal to establish a Front line demonstration (FLD) of sea cage farm comprising 20 numbers of 4 m diameter circular cages in 5 clusters of four cages each at suitable locations, off Jaleswar coast of Veraval, Junagadh District, Gujarat through *Bharath Adim Juth Matsyodyog Sahakari Mandali-Talala*, the registered society of the '*Sidi*' Adivasi Tribe. Through a Memorandum of Understanding (MoU) between the Institute and the Tribal Society, the TSP sea cage culture and front line demonstration trials of finfishes and lobsters would be implemented with the long term objective of socio-economic upliftment of *Sidi* tribal population of Gujarat.

Against this background, a post-Front Line Demonstration Impact Analysis was undertaken for the assessment of the socio-economic background of "*Sidi Badshahs*" of Junagadh District of Gujarat. The Front Line Demonstration (FLD) concept, initiated by the Indian council of Agricultural Research (ICAR) during the mid-eighties, wherein field trials are conducted in the farmers fields under the close supervision of the National Agriculture Research Scientists has been a very successful strategy for introducing new technologies and improved packages of practices specific for the region before the practices are fed into the main extension system of the State Department (Ray, 1991). The post- FLD impact assessment was done to examine how a proposed development, changes the lives of current and future residents of a community. The assessment can help communities to reduce inequities among community groups and also encourage the positive impacts associated with the development. The post-FLD impact analysis was carried out on the socio-personal, socio-economic and behavioural characteristics of *Sidis* practising cage culture (participant beneficiaries of the tribal society), non-participant beneficiaries of society and non-participant non- beneficiaries of the society. Besides, an attempt has also been made to compare cognitive

(knowledge), affective (attitude) and psycho-motor (skill perception) levels among the participant as well as, non-participant beneficiaries of the society and non-participant non- beneficiaries of the society.

## Materials and methods

Comprehensive population estimates of contemporary *Sidis* in India, have revealed that the largest groups of *Sidis* have been identified to be living in the states of Gujarat, Karnataka, Goa and Andhra Pradesh. For the present study, from the state of Gujarat, the district having maximum number of *Sidi* population namely Junagadh (Mickleem, 2001) was selected. From Junagadh District, Veraval and Talala taluks were selected for the study, where maximum number of *Sidis* were interested in cage culture of finfishes and lobsters (Fig. 1). The *Sidis* practising cage culture have been registered under the tribal society namely "*Bharat Adim Juth Matsyadhyog Sahkari Mandali*". A total of 135 *Sidis* were selected as respondents and were grouped into three categories namely (a) those who were practising cage culture and were members of the society (45 nos.) (b) those who were not practising cage culture but were members of the society (45 nos.) and (c) those who were neither practising cage culture nor members of the society (45 nos.).

A well structured interview schedule was constructed and the necessary socio-personal, socio-psychological and socio-economic variables for the post-FLD impact analysis were included for the study. The interview schedule was translated in to the local language, Gujarati for better interactions. Accordingly, 17 independent variables were selected. The behavioural variables used for the study were knowledge, attitude and skill perception of the three respondent categories towards cage culture practices. Knowledge of the respondents was measured using a Teacher made Knowledge test as adopted by Tesfaye *et al.* (2010). The test consisted of 11 items. For every correct answer on the knowledge item, a score of '1' was given and for every incorrect answer a score of '0' was given. The total score for each respondent for all the 11 items gave the knowledge score for that particular respondent. The attitude towards cage culture was measured using a 5 point Likert scale (1932) in which statements were rated along a continuum ranging from strongly agree to strongly disagree. For the present study, attitude has been operationalised as the degree of positive or negative affects towards cage culture by the *Sidis*. The attitude of a respondent was measured by adding the total scores obtained for 4 items in the scale, by attributing a score of 5 for 'strongly agree', 4 for 'agree', 3 for 'undecided', 2 for 'disagree' and 1 for 'strongly disagree' in the case of positive responses. In the case of negative responses, the scoring pattern was reversed. The total scores were calculated by adding individual scores of each response

for all statements. For measuring the perceived skills of the farmers towards cage culture, 4 point Likert type response scale was used. Each statement on perceived skill of the respondent was rated on a continuum ranging from good, fair, undecided and poor. Accordingly scores of 3, 2, 1 and 0 were given based on the responses obtained. The sum total of all the scores obtained for all the individual statements formed the score for the perceived skill towards cage culture. The data thus collected on all the variables were tabulated and analysed by applying appropriate statistical tools like percentage analysis, mean and standard deviation. The socio-personal, socio-psychological, socio-economic variables and the behavioural variables were categorised as low, medium and high using mean and standard deviation.

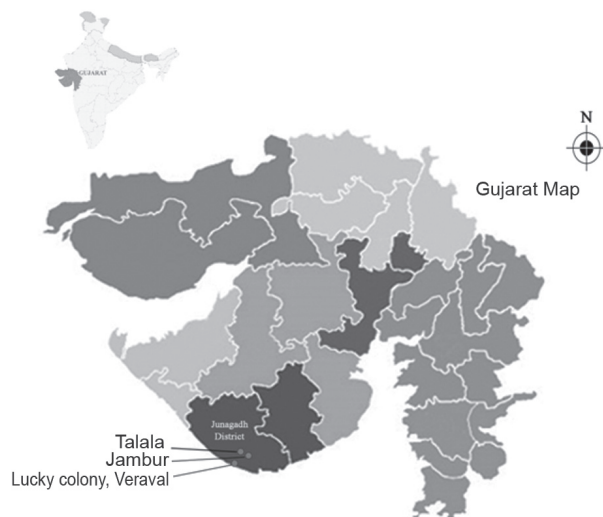


Fig. 1. Map of the study area

## Results and discussion

### *Socio-economic parameters*

Among the participant beneficiaries, most (58.33%) belonged to young age category (*i.e.*, <35 years of age), followed by 41.60% in the middle age category (36-45 years) and none in the old age category (>45 years). A similar trend was observed among the non-participant non-beneficiary category also. Similarly in the non-participant beneficiary category, most of the respondents (44.44%) were in the middle aged category followed by 33.33% in the young age and 22.22% in the old age category. Chi and Yamada (2002) observed that one of the important factors that trigger adoption of new technologies is the participation of progressive, young and educated male farmers.

Among the participant beneficiaries, most (58.33%) were having high school level of education and in non-participant beneficiaries, a higher percentage (55.55%)

were illiterate. In a study conducted by Zanu *et al.* (2012), on the factors influencing adoption of pig farmers in Ghana, it was found that, a relative high level of literacy was found to influence innovativeness among farmers. Among the non-participant non-beneficiaries, 50% were educated up to high school level, 25% were with secondary level of education and 25% were illiterate. Forster and Stem (1979), Baron (1981), Ervin and Ervin (1982) and Norris and Batie (1987) found that education has a positive impact on soil conservation technology adoption.

As far as the average monthly income was concerned, the participant beneficiaries had a higher average monthly income (₹1216.25) when compared to non-participant beneficiaries (₹ 854.25) and non-participant non-beneficiaries (₹ 1000). The non-participant non-beneficiaries were mostly working as agricultural labourers, rickshaw pullers, auto drivers and the females in the households were found to work as domestic helps.

Most of the participant beneficiaries (83.33%) had houses of their own while among the non-participant beneficiary group, most of them (72.22 %) lived in rented houses and only 27.77% in this category owned houses. Among the non-participant non-beneficiary group, cent percent had houses of their own.

With respect to the type of housing, it was observed that, most of the respondents (91.66 %) in participant beneficiary category, lived in thatched houses and a meager proportion (8.33 %) lived in concrete houses. Among the non-participant beneficiaries, it was observed that, 94.44% lived in thatched houses and only 5.55 % lived in concrete houses. With respect to the non-participant non-beneficiary households, it could be observed that, cent percent of the respondents lived in thatched houses.

As far as the basic facilities of living were considered, 83.33% of participant beneficiaries and 77.77 % of the non-participant beneficiaries, did not have latrines in their houses. Distribution of respondents based on the electrification of their houses was also studied. Most of the participant beneficiaries (75 %) had electrification in their houses followed by 25% who were deprived of this facility. Among the non-participant beneficiaries, 66.33% had electrification facilities and 33.33% did not have electrification. Among the non-participant non-beneficiaries only half of the respondents had electrification in their houses.

Among the three categories of *Sidis*, the maximum expenditure for food items was made by the participant beneficiaries amounting to an average monthly expenditure of ₹ 4308.33 and for non-food items the average monthly expenditure incurred by them amounted to ₹ 900. This is in confirmation with Engel's law which states that lower

income households spend a greater proportion of their available income on food than middle or higher income households.

Among the non-participant beneficiaries, the average monthly expenditure incurred for food and non-food items were ₹ 3133.33 and ₹ 1455.55 respectively. However, among the non-participant non-beneficiaries, the average monthly expenditure for food items was ₹ 3,500 and for non-food items, it was ₹ 2250.

The average monthly consumption of rice was highest among non-participant non-beneficiary group (17.25 kg), followed by non-participant beneficiary (16.72 kg) and least by participant beneficiaries (12.41 kg). As far as the non-participant beneficiaries were concerned, the consumption of wheat was 22.22 kg followed by vegetables (17.94 kg), bajra (10.33 Kg), onion and potato (10.11 kg). In the non-participant non-beneficiaries, intake of wheat was 17.50 kg followed by bajra (11.25 kg), potato (7.5 kg) vegetables (6.25 kg) and onion 4.5 kg.

Chicken was consumed more than mutton by all the 3 groups evidently as it is relatively cheaper compared to mutton. The average monthly consumption was 3.35 kg by participant beneficiaries, 3.05 kg by non-participant beneficiaries and 1.5 kg by non-participant non-beneficiaries. The average monthly consumption of mutton was relatively less being 1.66 kg by participant beneficiaries, and 2.08 kg by non-participant beneficiaries and 1.5 kg by non-participant non-beneficiaries respectively.

Table 1 shows the detailed monthly consumption of various food items. The consumption of fish was highest for the participant beneficiaries (11 kg).

Poultry is the main home based enterprise practised by the *Sidis*. Apart from poultry practised by 25% of non-participant non-beneficiaries and 5.55% practised by non-participant beneficiaries, none of the respondents practised any other types of home based enterprises. In the study area, it was observed that particular communities called *Makrani Musalman (Balluvas)* were herdsmen by tradition and they were mainly goat rearers

Table 2 depicts the general wage structure and hours of work per day for *Sidi* men and women labourers. It could be observed that the general wage structure was ₹ 150 for men and ₹ 100 for women labourers for 8-9 hours of work. The major crops grown in the study area were wheat, bajra and sugarcane and among the fruit crops, mango dominated.

#### *Cultural traits and social expenditure*

The yearly social expenditure incurred by the respondents belonging to the 3 categories was also recorded. Among the various items of social expenditure, it was observed that, the expenditure incurred on marriage ceremonies was highest. Category-wise, it was the highest for non-participant beneficiaries (₹1,33,389) followed by ₹ 30,000 for non-participant non-beneficiaries and ₹ 18,083 for participant beneficiaries.

*Sidis* at present follow monogamy in marriages, though 4-5 generations back it was customary for the *Sidi* men to have 2-3 wives. Stricken by poverty and unstable incomes, they are now encouraged to have only single spouse. It could be noted that, the participant beneficiaries and non-participant beneficiaries spend substantially on travel and their yearly expenditure on travel is ₹ 2070 and ₹ 1280.55 respectively. As far as religious expenditure

Table 1. Consumption of food items by Participant beneficiaries, Non-participant beneficiaries and Non-participant non-beneficiaries among *Sidis*

Category	Milk (litres)	Fish (kg)	Oil (kg)	Tea (kg)	Coffee (kg)	Chilly powder (kg)	Other masalas (kg)	Sugar (kg)	Fruits (kg)	Biscuits (packets)	Bread (kg)	Salt (kg)	Pickles (kg)
PB	19.56	11	5.04	0.91	0.008	0.95	0.98	3.333	4.333	2.5	0	1.16	0.54
NPB	17.77	6.83	4.77	0.87	0	1	0.82	4	3.11	3.94	0.16	1.19	0.05
NPNB	8.75	7.25	4	0.55	0	0.4375	0.412	2.375	2	1.25	0	0.875	0

*PB : Participant beneficiaries; NPB : Non-participant beneficiaries; NPNB : Non-participant non-beneficiaries*

Table 2. Wage structure and hours of work per day for *Sidi* men and women labourers

Nature of work	Wages of men and women per day (₹)		Hours of work per day
	Men	Women	
Farm labourers	150	100	9 h
Labourers in processing companies	150	100	8 h
Labourers in trawlers	150	-	10 h
Domestic help	-	100	8 h



was concerned, it could be observed that the non-participant beneficiaries spent ₹ 1851.11 yearly on religious ceremonies followed by participant beneficiaries (₹ 1783.33). The *Sidis* in Gujarat are mostly Sunni Muslims in faith. The yearly expenditure on entertainment was relatively less being ₹ 558.33, ₹ 376.47 and ₹ 300 for participant beneficiaries, non-participant beneficiaries and non-participant non-beneficiaries respectively. Some of the *Sidis* have troupes who perform daily at the folk arts and craft festivals at strategic tourist locations in the country on popular demand.

As far as the occupational profile was concerned, it was inferred that most of the participant beneficiaries (41.66%) were labourers in various fields followed by 25% working as farm labourers, 16.66% in fishing and 8.33% as fishing labourers and in private jobs respectively. Among the non-participant beneficiaries, most (55.56%) were involved in different types of labour, followed by 27.77% in farm labour and 16.67% in private jobs respectively. Among the respondents in this category, none of them was found to be involved in fishing or working as fishing labourers.

Among non-participant non-beneficiaries, most of them (75%) were involved as farm labourers and 25% were undertaking private jobs. In general, the *Sidis* do not have any specific occupations which provide them a sustainable source of income. Most of the *Sidi* men surveyed in Veraval and Talala talukas of Junagadh District of Gujarat are labourers in various sectors. Most of them are employed as farm labourers, trawler labourers, as rickshaw pullers, auto-rickshaw drivers and labourers in processing companies. Some are also vegetable vendors and way side hawkers. Some of their women folk gather firewood from the jungles such as the Gir Forest and sell them in the markets. While many members of the tribe work in the forest, some of them are in government jobs, earning up to ₹ 5,000 per month.

*Behavioural profile in relation to open sea cage culture*

Sea cage farming is a new initiative taken up by CMFRI for the *Sidi* tribes in Gujarat under the FLD programme. In this context, it was felt necessary to assess the knowledge, attitude and skill perceptions of the *Sidis* towards cage culture prior to the real implementation of the programme.

It could be observed from Fig. 2 that, most of the participant beneficiaries (41.67 %) had medium level of knowledge in cage culture followed by 33.33% with high level of knowledge and only 25% with low level of knowledge. The participant beneficiaries got initial training and awareness through FLD programmes organised by CMFRI. With respect to the non-participant category and

non-participant non-beneficiary category, none of the respondents had any knowledge about sea cage culture. In a similar study by Godtland *et al.* (2003) it was observed that, farmers who participated in the farmer field school programme have significantly more knowledge on integrated pest management (IPM) practices than those in the non-participant comparison group.

It could also be observed from the Fig. 2 that, most of the respondents among participant beneficiaries (50%) had medium level of attitude towards cage culture, followed by 33.33% in the high level category and 17% in the low level of attitude category. Among the non-participant beneficiary category, most (66.66%) were found to have a medium level of attitude towards cage culture followed by 33.34% in the high level of attitude towards cage culture. This finding implies that the non-participant beneficiaries might have developed a positive attitude towards cage culture due to their interaction with the participant beneficiaries since both the categories are coming under the purview of the tribal society namely the “*Bharat Adim Juth Matsyodhyog Sahkari Mandali*”. This finding also implies scope for motivating and persuading the non-participant beneficiaries to practise cage culture in the long run. The study further shows that, the non-participant non-beneficiaries have not yet formed any attitude towards cage culture because of the lack of interaction with participant beneficiaries.

Most of the participant-beneficiaries (75%) had medium level of perceived skill towards cage culture followed by 25% in the low level of perceived skill (Fig. 2). Among the non-participant beneficiaries, it could be observed that 61.11% were in the medium level and 38.89% in the high level of perceived skills. Among the non-participant non-beneficiary category, none of them exhibited any perceived skills towards cage culture.

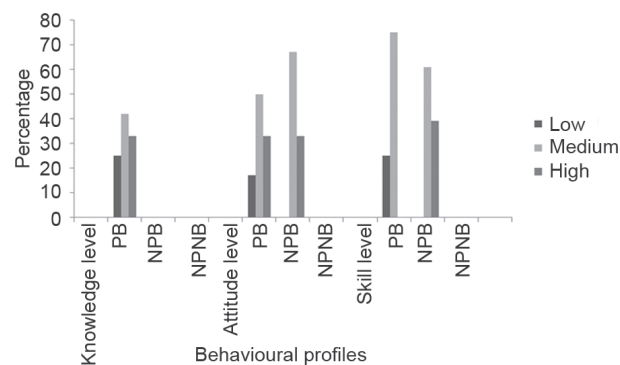


Fig. 2. Percentage distribution of different attributes of behaviour profile of different categories of *Sidis* in relation to cage culture

PB : Participant beneficiaries; NPB : Non-participant beneficiaries; NPNB : Non-participant non-beneficiaries

The *Sidis* are potential target group for cage culture involving finfishes and lobsters. *Sidis* practising cage culture and who are members of the tribal society namely the “*Bharat Adim Juth Matsyodhyog Mandali*”, are observed to have medium levels of knowledge, attitude and skill towards the open sea cage farming technology. These are the vital behavioural components which act as the prerequisites for ensuring successful adoption. Moreover, the non-participant beneficiary *Sidis* have also started forming a positive attitude towards cage culture as was revealed from the findings of the study. Valera *et al.* (1987) stated that diffusion of innovations will take place only with-in groups of people who are homogenous in terms of problems, aspirations and needs. Since the *Sidis* are a socially and culturally closely knit group strongly bound by customs and traditions, the diffusion of cage culture technologies to the other members of the community can be achieved without much difficulty.

The intervention praxis of TSP, in order to evolve from the linear logic of technology transfer to one based on participation requires behavioural change from all the key social actors and the development and application of new methods and types of interaction, reflecting changed power relations.

## References

- Aga Khan Foundation 2008. From exclusion to empowerment: Women of *Siddi* community, *Leisa India*, September, 8-10.
- Baron, D. 1981. Land ownership characteristic and investment in soil conservation, *United States Department of Agriculture ERS Staff Report No. AGES810911*, 68 pp.
- Basu, H. 1998. Hierarchy and emotion: love, joy, and sorrow in a cult of black saints in Gujarat, India, In: Werbner, P. and Basu, H. (Eds.), *Embodying charisma: modernity, locality and the performance of emotion in Sufi cults*. Routledge, London, p. 117-139.
- Forster, D. L. and Stem, G. L. 1979. *Adoption of reduced tillage and other conservation practices in the Lake Erie Basin*, US Army Corp of Engineers, Buffalo District, 67 pp.
- Godtland, E., Sadoulet, E., Janvry, Ade, Murgai R. and Ortiz, O. 2003. *The impact of farmer field schools on knowledge and productivity: a study of potato farmers in the Peruvian Andes*. Working Paper, Department of Agriculture and Natural Resources, University of California, 963: 24 pp
- Keay, John 2000. *India – A History*. Harper Perennial, London, 576 pp.
- Likert, Rensis 1932. A technique for the measurement of attitudes. *Arch. Psych.*, 140: 1–55.
- Micklem James 2001. *Sidis in Gujarat. Occasional papers*, No. 88, Centre for African Studies, University of Edinburgh, 27 pp.
- Norris, P. E., and Batie, P. E., 1987. Virginia farmers' soil conservation decisions: An application of Tobit analysis. *Southern J. Agric. Econ.*, 19: 79-90.
- Ray, G. L. 1991. *Extension communication and management*. Kalyani Publishers, Calcutta, 220 pp.
- Shah, A., Rakesh, T., Priya, M., Deepa, S. R., Periyasamy, G., Gururaj, K., Bhattacharya, T. Mohammed, S. Mustak, Bhaskar, L.V. K.S., Alla, G. Reddy, Gadhvi, D., Pramod, B. Gai, Chaubey, G., Nick Patterson, David Reich, Chris Tyler-Smith, Singh, L. and Thangaraj, K. 2011. Indian *Sidis*: African descendants with Indian admixture. *Am. J. Hum. Genet.*, 89:154-161.
- Tesfaye Tsion, Ranjan, S. Karippai and Teklu Tesfaye 2010. Farmers training effectiveness in terms of changes in knowledge and attitude: The case of Holeta, Melkassa and Debrezeit Agricultural Research Centres, Ethiopia. *J. Agric. Ext. Rural Dev.*, 2 (5): 89-96.
- Valera, J. B. and Plopino, R. F. 1987. Philosophy and principle of extension. In: Valera, J. B. Martinez, V. A. and Plopino, R. F. (Eds.), *An introduction to extension delivery systems*. Island Publishing House, Manila, p. 51-61.
- Zanu, H. K, Antiwiwaa, A. and Agyemang, C. T. 2012. Factors influencing technology adoption among pig farmers in Ashanti Region of Ghana. *J. Agri..Tech.*, 8(1): 81-92.