

# A Study on Technological Gap in Banana Cultivation Technologies in Southern District of Tamil Nadu

S. Nazreen Hassan

Department of Social Sciences, Agricultural College and Research Institute, Killikulam, TNAU

**Abstract-** Research findings have indicated the extent of awareness knowledge and adoption of banana cultivation technologies in Tirunelveli district. The study was taken up with a sample size of 120 farmers from three blocks of Nanguneri, Kalakkad and Cheranmahadevi with soil types of red sand, red loam and river alluvium respectively. Most farmers in the study area are small farmers and also their annual income ranged between one lakh and three lakhs. Most farmers in Nanguneri (35%), Kalakkad (50%) and Cheranmahadevi (52.5%) had an experience of more than 20 years in farming. All the farmers in the study area are in contact with the AAO. Most of the farmers watch TV (91.6%) and read newspapers (81.6) for agricultural related information. It was also found that adoption of recommended practices in banana cultivation had significant relationship with information seeking behaviour. From adoption gap in the twelve practices studied, it was seen that highest adoption gap was noticed in practices like application of micronutrients (98.33) followed by use of growth regulators (89.17%) and intercropping (80%) in earlier stage. The study reveals that the pattern of awareness gap, knowledge gap and adoption gap are similar. But the magnitude for adoption gap is twice higher than that of awareness gap and knowledge gap. Regarding the stages of adoption awareness and knowledge stage has been well addressed by the state department. The farmers are also convinced about the technologies. Since most farmers are small and marginal farmers, their perception is more on the results to which they are uncertain and feel that the technologies with higher adoption gap only further increases their cost of production.

**Index Terms-** Banana cultivation , information seeking behaviour ,Technologies, awareness, knowledge, adoption

## I. INTRODUCTION

Banana is one among the auspicious fruit crops grown in Tamil Nadu. Banana has great socio-economic and religious significance. Banana is the fourth-important food ingredient in terms of gross value exceeded only by rice, wheat and milk product. In Tamil Nadu it is grown in 81498 ha with production of 34,61,788 tones and productivity 41.10t / ha. It is also used intensively for religious purposes. This is why the price of banana increases steeply during festival season. It has also very high export value. There are large numbers of banana varieties growing in different parts of Tami Nadu. They include Virupakshi, Robusta, Rad Banana, Poovan, Rasthali, Nendran, Monthan, Karpuravalli, Sakkai, Peyan, Matti. According to the statistics available with the Department of Agriculture, banana is

cultivated on 9446 hectares in Tirunelveli district. The major varieties cultivated in the area are 'nenthran', 'rasakathali' 'nadu and 'robusta'. Since this district is one of the border districts of Kerala, the varieties like nendren and robusta grown in the area have buyers from the nearby states. They get reasonable prices from the buyers from Kerala. During festival seasons this fruit fetches high prices to the farmers. Nendren variety is mostly preferred by the buyers since it is used for making chips and banana powder.

## II. RESEARCH ELABORATIONS

Studies show that the productivity of banana in Tamil Nadu is far below the highest productivity in India which is 58.60 tonnes which is observed in Maharashtra. Since there is vast potential to enhance the productivity of banana in the sampling district, the study on adoption of banana cultivation technologies becomes essential. Walke et al., (1995) found that 47.33 percent of banana farmers had medium level of knowledge in banana cultivation. Marimuthu (1998) reported that more than one third of the respondents had high level of knowledge in banana cultivation. Baiyeri and Ajayi (2000) identified primary constraints to banana in the area where lack of farm land (23%), unavailability of storage facilities(22%) and poor soil fertility due to erosion(22%). Joechin (2003) probed and found that information constraint is reported by 20 percent of non adopters, supply constraints by 8% and input constraint by 27% of the non adopters. Fateroti et al., (2006) showed that all the respondents adopted at least one of the fourteen disseminated innovations and the average adoption level was 40.33 percent.

## III. METHODOLOGY

### *Location of study*

The study was taken up in Nanguneri with 3400ha, Cheranmahadevi with 2000 ha and Kalakkad with 1640 ha . One hundred and twenty banana growers were randomly selected for the study. The study is restricted to three blocks having three different soil types. The soil type in the study area are as follows

Nanguneri	Red sandy
Kalakkad	Red loam
Cheranmahadevi	River alluvium

### *Variable selection:*

The dependent and independent variables for the study were identified based on review of literature and discussion with experts in the field. They include: age, education, occupation,

farming experience, farm holdings, area under banana cultivation, annual income, information seeking behavior, awareness ,knowledge and adoption on banana cultivation technologies.

Twelve farm operations which reflect on the yield of banana were considered for the study. The farm operations were

identified based on discussion with Scientists and Extension Workers and pre survey. The package of practices/ recommendations as given by the Tamil Nadu Agricultural University was used as the reference to assess the adoption in different practices.

**Table 1. Selected recommended Practices on Banana Cultivation selected for the study**

S. No	Items	Recommendations																								
1	Varieties	Rasthali, Nendren																								
2	Spacing	Robusta and Nendran 1.8 mx 1.8m 3080 plants/ha																								
3	Selection of suckers	Sword suckers of 1.5 to 2.0 kg weight free from diseases and nematodes.																								
4	Pre- treatment of suckers	(i) Pralinage with 40 g of Carbofuran 3 G granules per sucker. (ii) Dip the corm with 0.75% Monocrotophos, shade dry for atleast 24 hours and plant.																								
5	Intercropping at earlier stages	Leguminous vegetables can be grown as intercrops																								
6.	Recommended Fertilizer	<table border="1"> <thead> <tr> <th>Details</th> <th>N</th> <th>P</th> <th>K</th> </tr> </thead> <tbody> <tr> <td><b>Garden land</b></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Nendran</td> <td>150</td> <td>90</td> <td>300</td> </tr> <tr> <td><b>Wetland</b></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Nendran</td> <td>210</td> <td>35</td> <td>450</td> </tr> <tr> <td>Robusta</td> <td>160</td> <td>50</td> <td>390</td> </tr> </tbody> </table>	Details	N	P	K	<b>Garden land</b>				Nendran	150	90	300	<b>Wetland</b>				Nendran	210	35	450	Robusta	160	50	390
Details	N	P	K																							
<b>Garden land</b>																										
Nendran	150	90	300																							
<b>Wetland</b>																										
Nendran	210	35	450																							
Robusta	160	50	390																							
7	Use of Growth Regulators to improve the grade of bunches	2, 4-D at 25 ppm (25 mg/lit) after the last hand has emerged. Spray CCC 1000 ppm at 4th and 6th month after planting.																								
8	Micronutrients application at 3 <sup>rd</sup> , 5 <sup>th</sup> and 7 <sup>th</sup> months after planting	ZnSO <sub>4</sub> (0.5%), FeSO <sub>4</sub> (0.2%), CuSO <sub>4</sub> (0.2%) and H <sub>3</sub> BO <sub>3</sub> (0.1%)																								
9	Desuckering	After 8 months from removal of suckers at monthly intervals																								
10	Propping	At bunch emergence																								
11	Bunch cover for better appearance	Use transparent polyethylene sleeves with 2% (during cool season) - 4% (during summer season) ventilation to cover the bunch immediately after opening of the last hand.																								
12	Integrated pest management practices	Swabbing of monocrotophos 2ml/litre over the pseudostem. Stem injection with monocrotophos Hot water treatment of suckers Use of cosmolure trap Application of carbofuran and neem cake.																								

**Development of Questionnaire:**

A questionnaire to collect data based on the objectives was developed for the study.

**Pre-survey and refinement of Questionnaire:**

A pre-survey was conducted at *Srivaikundam* of Thoothukudi district and the questionnaire was modified based on the survey. Accordingly from sixteen recommended practices 12 practices were finalised for study.

**Survey:**

Survey was conducted in *Nanguneri, Kalakkad* and *Cheranmahadevi* blocks of Tirunelveli district. Forty farmers from each block were contacted for the survey. A total of one hundred and twenty farmers were contacted. Data was collected using a structured questionnaire. Consolidation and tabulation of data was done.

**Research Design:** Exploratory study

**Statistical tools used:** Data obtained was analyzed using the following statistical tools

- Mean
- Frequency
- Percentage
- Standard deviation
- Correlation

**Awareness gap**

Awareness gap has been defined as the proportion of gap in the awareness about the recommended practices and it is expressed in percentage (Ray *et. al.*, 1995). The awareness gap of a particular practice expressed in percentage was:

Awareness Gap =  $\frac{\text{Total no. of responses that can be obtained for the selected practice} - \text{No. of responses for the selected practice}}{\text{Total no. of responses that can be obtained for the selected practice}} \times 100$

**Knowledge Gap**

In the present study Knowledge gap was operationalised about the proportion of knowledge gap about the twelve recommended banana cultivation practices by the farmers and expressed in percentage. The measurement procedure is followed as in awareness gap.

Knowledge Gap =  $\frac{\text{Total no. of responses that can be obtained for the selected practice} - \text{No. of responses for the selected practice}}{\text{Total no. of responses that can be obtained for the selected practice}} \times 100$

**Adoption Gap**

In the present study Adoption gap was operationalised about the proportion of gap in adoption about the twelve recommended banana cultivation practices by the farmers and expressed in percentage. The measurement procedure is followed as in awareness gap.

Adoption Gap =  $\frac{\text{Total no. of responses that can be obtained for the selected practice} - \text{No. of responses for the selected practice}}{\text{Total no. of responses that can be obtained for the selected practice}} \times 100$

Total no. of responses that can be obtained for the selected practice

**IV. RESULTS**

The area under banana cultivation in Tirunelveli district is increasing every year. Tirunelveli has been identified as one of the potential areas in banana cultivation. In order to increase the productivity of banana it is essential to study the adoption of the recommended practices.

**Table 2 Profile characteristics of Banana growers**

**N=120**

Profile Characters	Category	Nanguneri N=40		Kalakkad N=40		Cheranmahadevi N=40	
		No	%	No	%	No	%
<b>Age</b>	< 40	17	42.5	15	37.5	18	45
	41-50	10	25	18	45	16	40
	51-60	6	15	3	7.5	3	7.5
	Above 61	7	17.5	4	10	3	7.5
	Total	40	100	40	100	40	100
<b>Education</b>	Illiterate	0	0	1	2.5	1	2.5
	Primary	9	22.5	14	35	14	35
	High school	24	60	14	35	16	40
	Secondary	5	12.5	5	12.5	7	17.5
	Graduate and above	2	5	6	15	2	5
Total	40	100	40	100	40	100	
<b>Occupation</b>	Banana cultivation as main crop	21	52.5	28	70	26	65
	Banana cultivation as secondary crop	19	47.5	12	30	14	35
	Total	40	100	40	100	40	100
<b>Annual income</b>	<100000	16	40	15	37.5	12	30
	100001-300000	22	55	20	50	24	60
	>300000	2	5	5	12.5	4	10
	Total	40	100	40	100	40	100
<b>Farming Experience</b>	< 5 years	1	2.5	0	0	0	0
	5-10 years	13	32.5	3	7.5	5	12.5
	11-15 years	6	15	9	22.5	8	20
	16-20 years	6	15	8	20	6	15
	< 20 years	14	35	20	50	21	52.5

Profile Characters	Category	Nanguneri N=40		Kalakkad N=40		Cheranmahadevi N=40	
	Total	40	100	40	100	40	100
<b>Farm size</b>	< 1 ac	3	7.5	2	5	3	7.5
	1-2 ac	16	40	15	37.5	13	32.5
	2.1 -3 ac	11	27.5	13	32.5	8	20
	>3.1 ac	10	25	10	25	16	40
	Total	40	100	40	100	40	100
<b>Area under banana cultivation</b>	< 1 ac	17	42.5	6	15	10	25
	1-2 ac	17	42.5	28	70	18	45
	2.1-5 ac	6	15	4	10	7	17.5
	>5.1 ac	0	0	2	5	5	12.5
	Total	40	100	40	100	40	100
<b>Material possession</b>	1-5 nos	37	92.5	36	90	37	92.5
	6-10	3	7.5	4	10	2	5
	11-15	0	0	0	0	1	2.5
	Total	40	100	40	100	40	100

### Age

Most of the farmers in Nanguneri (42.5%) and Cheranmahadevi are young farmers in the age group below 40 years. This shows a positive trend in agricultural scenario which attracts more of young farmers in agriculture. A majority of farmers in Kalakkad are coming under the age group between 41 and 50 years.

### Education

Most of the farmers have education level upto high school. This is followed by farmers with an educational level upto fifth standard. Only 2.5 % farmers were found to be illiterates in Cheranmahadevi as well as in Nanguneri blocks.

### Occupation

Most of the farmers in the area grow banana as their main crop. This is because they get good returns due to the demand in the nearby state, Kerala. It was found that more than half of the farmers in the area have banana as their main crop as seen in Nanguneri (52.5%), Kalakkad (70%) and Cheranmahadevi(65%).

### Annual Income:

Most farmers in the area are small farmers and also their annual income ranges between One lakh and three lakhs.

### Farming Experience:

Most of the farmers had farming as their traditional occupation. So a majority of farmers had a farming experience

for more than 20 years. It is seen from the table that most farmers in Nanguneri (35%), Kalakkad(50%) and Cheranmahadevi (52.5%) had an experience in growing banana for more than 20 years.

### Farm size:

The survey results show that most farmers in the study area are having farm area ranging from 1 to 3 acres .

### Area under banana:

Most farmers in the study area are cultivating banana one to two acres only. The farmers grow banana since they get more returns from this commercial crop compared to the earlier food crop that is rice. .

### Material possession

Majority of the farmers in all the blocks had one to five numbers of farm materials which they make use for their farming purpose. Only 2.5 % of farmers in Cheranmahadevi have more than ten numbers of materials which includes farm implements.

### Information seeking Behaviour

The various channels of communication were also studied. The farmers are in contact with the AAO in personnel channel. Personal localite channels like relatives (60%), farmers from own village (51.67%) and friends (45.8%) were used by the farmers. The farmers use impersonal channels like television (91.67%), newspaper (81.67%) and radio 64.17 %)

**Table 3 Information Seeking behaviour of Banana Growers  
N=120**

S. No.	Information source	No	Percent
1	AAO	120	100.00
2	AO	58	48.33
3	ADA	40	33.33
4	JDA	24	20.00
5	Scientists	26	21.67

6	Trainings/Seminars	43	35.83
7	Farmers from own village	62	51.67
8	Farmers from other villages	45	37.50
9	Friends	55	45.83
10	Relatives	72	60.00
11	Neighbours	35	29.17
12	Input dealers	21	17.50
13	Local leaders	23	19.17
14	Radio	77	64.17
15	TV	110	91.67
16	Newspaper	98	81.67
17	Farm materials	30	25.00
18	Farm magazines	7	5.83

Only 5.83% of the farmers were found to be reading farm magazines. The farmers who have attended trainings and seminars are only 35.8 percent. except for news papers the other print media are not used by the farmers.

**Adoption of recommended banana cultivation technologies**

Any technology developed becomes successful only when it reaches the targeted people. Technologies are developed by the Tamil Nadu Agricultural University. If a farmer is satisfied with

a technology he adopts it. Based on the study conducted in the study area it was found that all of farmers in the study area grow varieties suitable to the area. Recommended spacing (87.5%) and sucker selection (92.5%) is done by most of the farmers in Nanguneri . In Kalakkad also it was found that most of the farmers adopted sucker selection method (92.5%) and spacing (87.5%)..

**Table 4 Adoption of recommended banana cultivation technologies.**  
N=120

Technology	Nanguneri N=40		Kalakkad N=40		Cheranmahadevi N=40	
	No	%	No	%	No	%
Varieties	40	100	40	100	40	100
Spacing	35	87.5	35	87.5	27	67.5
Selection of suckers	37	92.5	37	92.5	26	65
Pre- treatment of suckers	29	72.5	31	77.5	24	60
Intercropping at earlier stages	2	5	0	0	1	2.5
Recommended Fertilizer	18	45	20	50	13	32.5
Use of Growth Regulators to improve the grade of bunches	0	0	0	0	2	5
Micronutrients application at 3 <sup>rd</sup> , 5 <sup>th</sup> and 7 <sup>th</sup> months after planting	0	0	0	0	0	0
Desuckering	33	82.5	29	72.5	24	60
Propping	20	50	19	47.5	22	55
Bunch cover for better appearance	25	62.5	29	72.5	16	40
Integrated pest management practices	11	27.5	6	15	2	5

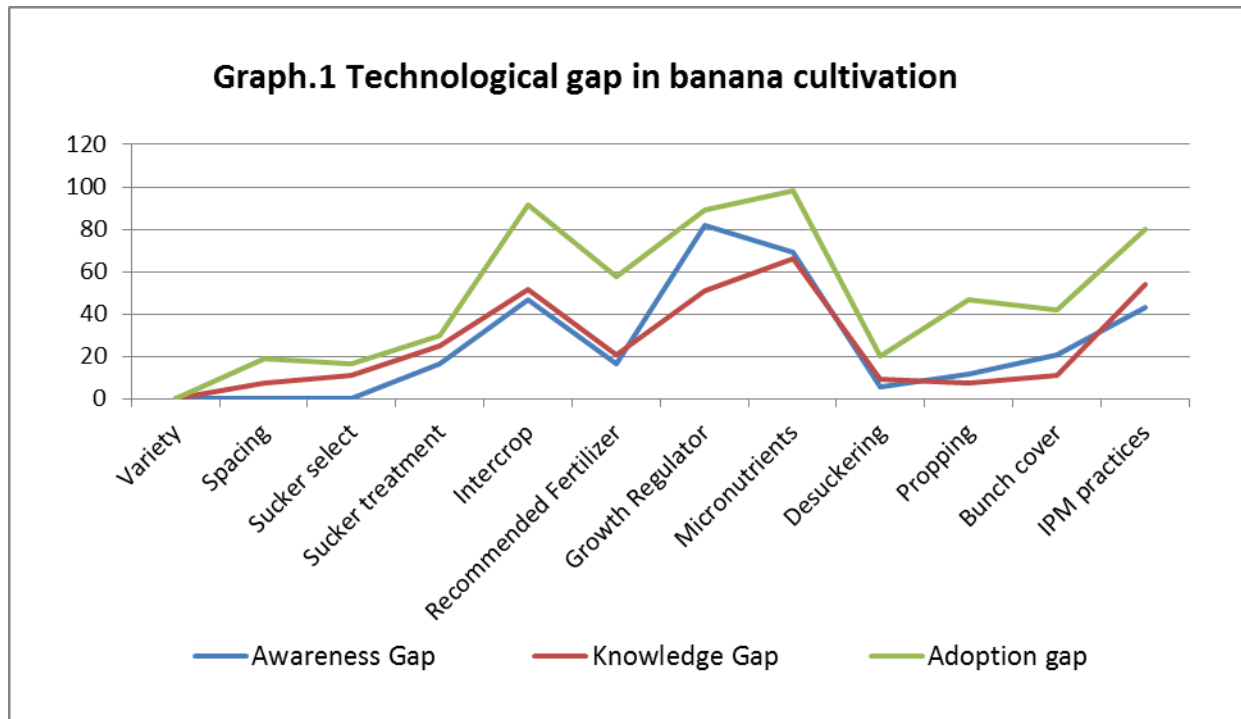
Adoption in growing inter crops is found to be minimum in Nanguneri and Cheranmahadevi and none adopted in Kalakkad. Application of micronutrients is not adopted in the study area. Application of growth regulators are seen only in Cheranmahadevi (5%). IPM practices is adopted by 27.5% in Nanguneri, 15% in Kalakkad and 5% in Cheranmahadevi Block.

Adoption of micronutrient application is the least observed in the study area. This is followed by use of growth regulators and intercropping. IPM is also seen to have low adoption level. These can be further confirmed by finding out the adoption gap in the study area.

**Technology gap analysis**

Analysis of the extent of the gap in technology is essential for making any change in development of the crop. The gap in awareness, knowledge and adoption was studied and the results are as follows

**Fig 1. Technological Gap in Banana Cultivation Practices**



It is evident from the graph that a similar gap pattern is seen for awareness knowledge and adoption of banana cultivation practices. The adoption gap is higher than knowledge gap which is on par with awareness gap. The highest adoption gap is seen to be the highest in application of micronutrients followed by use of growth regulators and intercropping in earlier stage.

**V. DISCUSSION**

All technology adoption decisions carry with them some uncertainty in outcomes from unfamiliar techniques. The observed patterns of technology adoption are typically influenced by the farmers’ individual risk preferences and their ability to bear the risk of a new and uncertain endeavor. Human capitals are traditionally focused on education and health so there is less support from the family members. The labor problem affects technology adoption; seasonal availability adds another dimension. Lack of Support for marketing, less price and market intermediaries also adds to non adoption of the technologies. Damage due to wild animals and strong winds also are reasons for investing more on the crop.

The study reveals that the pattern of awareness gap ,knowledge gap and adoption gap are similar. But the magnitude for adoption gap is higher than awareness and knowledge gap. This has to be reduced.

The study reveals that the mean awareness gap (26.04), mean knowledge gap (26.18) are similar but mean adoption gap (49.24) is twice that of the other two gaps studied. The

magnitude for adoption gap is higher than awareness and knowledge gap. This has to be reduced. The information seeking behavior of the famers is positively significant with adoption of the recommended practices in banana cultivation. Most of the farmers watch TV (91.6%) and read newspapers (81.6) for agricultural related information. Hence these mass media channels can be very effectively utilized for reducing the adoption gap. The farmers also contact the extension agency in their area. Hence we can strengthen the research extension farmer linkage system through ATMA and conduct more farmer interfaces along with result demonstrations which will further increase the adoption rate in the district. .

The farmer in the area need to be convinced with the profitability of the recommended practices. Media can be used as a major device to transfer technologies. Newer and promising technologies like fertigation, drip irrigation can be popularised among the banana growers by using result demonstrations. The control of market intermediaries can be reduced by group approaches.

**VI. CONCLUSION**

The findings of the study have to be viewed in the specific context of the conditions prevailing in the area and these findings will be applicable wherever similar conditions prevail. Action researches can be done to popularise technologies like fertigation and drip irrigation. The felt need recognized by any farmer is his additional income from any inclusion in his farming system. The

focus on this can be done by conducting more result demonstrations in the area.

#### REFERENCES

- [1] Walke P K, Wangikar S D and Rout A C (1995). Knowledge and adoption of recommended package of practices of banana crop. Maharashtra Journal of Extension Education 14:201-04
- [2] Marimuthu (1998). Marimuthu, P. 1998. Marketing Behaviour of Banana Growers. Unpub. M.Sc.(Ag.) thesis, AC &RI, TNAU, Madurai.

- [3] Joechin . Adoption of superior banana varieties in the kagera region: Accomplishments and constraints. 2003
- [4] Rogers, E. M. Diffusion of Innovations. New York: Simon and Schuster 2010

#### AUTHORS

**First Author** – S. Nazreen Hassan, Department of Social Sciences, Agricultural College and Research Institute, Killikulam, TNAU