"An Over View of the Implementation of Precision Farming Projects in Tamil Nadu, India"

Ramamoorthy, Dr. R. Ravikumar and A, Mr Jagan Gopu

Assistant Professor of Economics, PSG College of Arts and Science,
Research Scholar in Economics, PSG College of Arts and Science

12 September 2016

"An Over View of the Implementation of Precision Farming Projects in Tamil Nadu, India"

Dr. R. Ravikumar* and Jagan Gopu. A**

***Assistant Professor of Economics, PSG College of Arts and Science, Coimbatore, Tamil Nadu, India.**

****Ph. D Full-Time Research Scholar in Economics, PSG College of Arts and Science, Coimbatore, Tamil Nadu, India.**

Abstract

The major problem for the failure of agricultural sector in India is believed to not taking the modern methods and innovations from the knowledge quarters to the agricultural field. Without the meeting of technology and ground level implementation, the benefits of modern technology and science cannot be optimal. Unsuitability of technology given the local agro-climatic conditions, unawareness of technology due to a communication gap, unwillingness to take unknown risks due to lack of trust, lack of knowledge, cultural barriers, lack of adequate credit of support for investment which is a prerequisite to the adoption of technology, to overcome these barriers, sound management of the technology dissemination need to be followed. The demonstration conducted by the Official of the project at Krishnagiri block, in Pennaiyar river sub basin, Alapatti tank in Krishnagiri district reveals that the initial demonstration implemented in the period of October 2008 to March 2009 with the 39 farmers and covered 26 hectare. The sustainability is very important aspect to measure the success or failure of the precision farming in the implemented area hence 134 farmers with 40 ha coverage showed that the real demonstration effects on farmers were adopted and sustained with precision farming through the year with various multi crops cultivated by the farmers because of higher yield, least inputs and more than that huge income from the farm. Followed by the last year Oct 2011 to Mar 2012 the total area of demonstration covered 110 ha and the impact also 110 ha with the overall demonstration which spread across the area with the total sustainability area is 448 ha.

Key Words

Precision Farming, Modern Technology, Adoption of Technology, Sustainability.

Introduction

Agriculture largely depends on rain fall in Tamil Nadu in general and the districts like Dharmapuri and Krishnagiri are drought prone in particular, with only 925 millimeters of rainfall in a year. The per capita availability of water resources in Tamil Nadu in only 900 cubic meters for a year to the population about 62 million, when compared to the all India average of 2,200 cubic meters. Tamil Nadu geographical area can be grouped into 17 river basins and 127 sub basins a majority of which are water stressed. There are 70 major reservoirs, about 40,000 tanks of traditional water harvesting structure and about 3 million wells that heavily capture the available surface water. Predominantly, agriculture is the largest consumer of water in the state, using 75 per cent of the state water. Approximately 30 per cent of the net irrigated area of 30 lakh hectares is irrigated by canals and 21 per cent by tanks, while 49 per cent is fed by wells and the remaining area is irrigated by other sources.

The disputes of river water sharing from the states such as Andhra Pradesh, Karnataka and Kerala which necessitates more importance of water due to it scarcity of the prime sector. In this contest, that the modern method of irrigation methods are adopted in agriculture of Tamil Nadu. Micro irrigation was an effective tool for conserving water resources and studies have revealed significant water saving ranging between 25 to 50 per cent by drip irrigation compared with surface irrigation, with yield increases as high as 100 per cent in some crops under specific locations.

Technology can be a game changer in the agro sector, especially in the developing world. Let us analyse three experiences of precision farming from Tamil Nadu, where technology has been employed instrumentally to reform the productivity and yield of the farm lands.

Present Status of Precision Agriculture in India

Precision farming in the Indian context is still in its infancy stage. A vast amount of data on various aspects like soil characteristics, climatic parameters, topographic features, crop requirement in terms of consumptive use and nutritional requirements have been generated and instruments needed for recording these parameters are also available. There are many other examples wherein a few components of precision farming have been adopted to greater advantages in increasing the returns from the land. Therefore, there is an urgent need to develop a package based on knowledge of soil environment and crop needs to enhance the efficiency of

inputs to get higher output in given time frame. Some discrete initiatives have been started towards the application of this technology. PA has been identified as one of the main thrust areas by the Working Groups (WGs) of India–US Knowledge Initiative on Agriculture (KIA)[1]. It is expected that PA research will be an important part of the recently launched ambitious agricultural research program, National Agricultural Innovation Project (NAIP), which will focus on innovations in agricultural technology with the announced budget of US$ 285 million[2].

The Project Directorate for Cropping Systems Research (PDCSR), Modipuram and Meerut (Uttar Pradesh state) in collaboration with Central Institute of Agricultural Engineering (CIAE) [3], Bhopal also initiated variable rate input application in different cropping systems[4]. With the Space Application Center (ISRO), Ahmedabad has started experiments in the Central Potato Research Station farm at Jalandhar, Punjab, to study the role of remote sensing in mapping the variability with respect to space and time[5]. Development of specialized centers and scientific data bank is a well-known pre-requisite for PA.

National Bank for Agriculture and Rural Development (NABARD) supported a three year project beginning in 1999 by establishing a resource centre for precision farming at JRD Tata Ecotechnology Centre of the MSSRF M.S. Swaminathan Research Foundation[6]. Arava R&D, Israel, provided technical support for this project. The foundation set up five demonstration farms initially in Tamil Nadu and plan to replicate them in other states. In one of the adopted villages a soil spectral variability map showed at least four types of soil in the area, but the entire village was applying a similar fertilizer dose for their chickpea crops. Therefore, a trail on Variable Rate of Application (VRA) technology has been undertaken[7]. As an example of collaborative effort of private and Govt. agencies, MSSRF at Kannivadi in Tamil Nadu with financial support from the National Bank for Agriculture and Rural Development (NABARD) and works with an objective of poverty alleviation by applying PA technologies. Also, several

---

[1] Anonymous (2007), India-US Knowledge Initiative on Agriculture-work Plan http://www.icar.org.in.
[2] Anonymous (2007), National Agricultural Innovation Project launched. http://www.dare.nic.in.
[3] Shanwad et al., (2004), Precision Farming Dreams and Realities for Indian Agriculture. Proceeding of 7th Annual International Map India Conference, New Delhi, India. Available online at: http://www.gisdevelopment.net/application/agriculture /overview /mi04115.htm.
[4]Swain et al., (2004), Precision Agriculture for India: Potential, Prospects and Strategies. Presentation at 38 Annual Convention and Symposium of Indian Association of Agricultural Engineers (ISAE), Dapoli, Maharashtra, India.
[5] Shanwad et al., (2006), Precision Farming: Dreams and Realities for Indian Agriculture http://www.GISdevelopment.net
[6] Anonymous. (2007), Ongoing Today: 1998 to 2004. http://www.mssrf.org.
[7] Ray et. Al., (2001), Precision Farming in India Context. GIS @ Development. November, Pp. 7.

low-cost GIS based decision support system and farm machinery are attracting wide attention for their use in precision farming[8].

Taking Technology to the Fields

On of the problem is the failure to take laboratory science to the field or doing so ineffectively. Without the meating of technology and ground level implementation, the benefits of modern technology and science cannot be optimal. This problem may arise due to a variety of reason, some of which could be:

1. Unsuitability of technology given the local agro-climatic conditions,
2. Unawareness of technology due to a communication gap,
3. Unwillingness to take unknown risks due to lack of trust,
4. Improper use of technology at the field level due to lack of knowledge,
5. Cultural barriers to adoption of modern technology, and
6. Lack of adequate credit of support investment which is a prerequisite to the adoption of technology.

To overcome these barriers, sound management of the technology dissemination need to followed. This would require out of the box ideas which, in a cost effective way, can overcome these issues. Further, discuss some of the examples of how this has been achieved.

Statement of the Research Problem

The major problem for the failure of agricultural sector in India is believed to not taking the modern methods and innovations from the knowledge quarters to the agricultural field. Without the meeting of technology and ground level implementation, the benefits of modern technology and science cannot be optimal. Unsuitability of technology given the local agro-climatic conditions, unawareness of technology due to a communication gap, unwillingness to take unknown risks due to lack of trust, lack of knowledge, cultural barriers, lack of adequate credit of support for investment which is a prerequisite to the adoption of technology, to overcome these barriers, sound management of the technology dissemination need to be followed. The demonstration conducted by the Officials of the project at Krishnagiri block, in Pennaiyar river sub basin, Alapatti tank in Krishnagiri district.

[8] Ancha Srinivasan, (2006), Handbook of Precision Agriculture, The Haworth Press, Inc, doi: 10.130015627_18, Pp No. 513-14.

Objectives of the Study

1. To study the cost, benefit and yield under the precision farming schemes in Tamil Nadu, and
2. To understand the status of the projects implemented under precision faming in Tamil Nadu.

Methodology

The study was conducted in Krishnagiri district of Tamil Nadu, India during the period of October 2008 to March 2009 with the 39 farmers and covered 26 hectare. The sustainability is very important aspect to measure the success or failure of the precision farming in the implemented area hence 134 farmers with 40 ha coverage were observed during the year 2010 - 11. Followed by the last year Oct 2011 to Mar 2012 the total area of demonstration covered 110 ha and the impact also 110 ha with the overall demonstration which spread across the area with the total sustainability area was 448 ha. Simple statistical tools such as percentage share and annual growth rate were used to analyse the data.

Tamil Nadu Precision Farming Project

The TNPFP was first implemented Tamil Nadu in Dharmapuri and Krishnagiri districts during 2004-05. Both districts suffered from water scarcity and farmers in the region followed traditional agricultural practices. The government of Tamil Nadu has undertaken the task of implementing the TNPFP through the TNAU. The project covered 400 ha with the main focus on 40 – 60 per cent enhanced yield and effective market linkage. The farm land of the Krishnagiri and the Dharmapuri districts are predominantly rain-fed and resource poor region.

Table – 1 the Details of Year Wise TNPFP Implementation

Sl. No	Particulars	1st year	2nd year	3rd year	Total
1	Area (in ha)	100	200	100	400
2	Financial Outlay (Rs. In Cores)				
	(i) Cultivation	0.40	0.80	0.40	1.60
	(ii) Drip and Fertigation	0.75	1.50	0.75	3.00
	(iii) Other Including consultancy Establishment	0.94	0.86	0.80	2.60
	Total	2.09	3.16	1.96	7.20
3	Subsidy component to the farmers (restricted to 1.15) lakhs	100%	90%	80%	-

Source: TNPFP project Report

It was implemented initially for a period of three years on 250 acres in 2004 – 05, then in 500 acres in 2005 – 06 and 250 acres in 2006 -07 and totally 700 farmers with 400 ha were covered. The Tamil Nadu Agricultural University was the nodal agency that implemented this project with total budget of Rs. 720 lakhs for a period of three years. An amount of Rs. 75,000 for the installation of drip irrigation and Rs. 40,000 for crop production expenses was given to each farmers. One unit is equivalent to one hectare and a farmer is eligible for one hectare only.

The first crop was taken up under the total guidance of scientists from the university, while the subsequent five crops were taken up by the farmers in three years. In the first year, the farmers were unwilling to undertake this project because of their frustration due to the continuing drought in that area for four years since 2002. But after seeing the success of the first 100 farmers and the high market rate for the produce obtained from this scheme, farmer started registering in large numbers during the second year (with 90 per cent of subsidy) and the third year (with 80 per cent of the subsidy). Within a short period, the farmers were enjoying yields that were 3 to 12 times higher than that of normal. They were also conserving water and spending less money on labour.

Table – 2 Comparative Statement of Cost and Benefits per ha

Sl.No	Particulars	Conventional system	Precision farming System
1	Drip and Fertigation System	-	Rs. 75,000 (5 years) Rs. 15,000 (Annum)
2	**Cultivation expenses**		
I	Field Preparation	5600	7500
Ii	Nursery and Planting	6000	12000
Iii	Weeding	10000	6000
Iv	Plant Protection	10000	8500
V	Fertilizers	8000	20000
Vi	Wages	10000	7000
Vii	Staking	-	60000 (4 years) or 15000
	Total	49600	76000
A	Yield	30MT/ha	135MT/ha
B	**Grades**		
	Grade I	40%	90%
	Grade II	40%	5%
	Grade III	20%	5%
C	Weight gain	-	25% more weight
D	Water Economy	-	40%
E	Harvest	10 harvest	30 harvest

Source: Directorate of Extension Education & Nodal Officer (TNPFP)

Table – 3 Comparative Statement of Cost of Cultivation and Yield under Conventional System and Precision Farming

Sl. No	Crops	Cost of Cultivation		Yield (MT/ha)		% yield increases over CS
		CS	PF	CS	PF	
1	Tomato	61000	99800	50 MT	150 MT	200.00
2	Chilli	46000	68000	22 MT	35 MT	59.09
3	Paprika	49000	72000	37 MT	60 MT	62.16
4	Capsicum	49000	72000	18 MT	25 MT	39.00
5	Brinjal	50000	82000	60 MT	150 MT	150.00
6	Bhendi	40600	62000	10 MT	16 MT	60.00
7	Cabbage	51500	78000	75 MT	110 MT	46.00
8	Cauliflower	51500	78000	32000 Flowers	44444 Flower	38.89
9	Tapioca	30000	49000	30 MT	45 MT	50.00
10	Water melon	50000	72000	40 MT	60 MT	50.00
11	Musk melon	56000	76000	22 MT	34 MT	55.00
12	Ribbed gourd	42000	74000	20 MT	30 MT	50.00
13	Bottle gourd	42000	74000	40 MT	66 MT	65.00
14	Cotton	35000	60000	20 Q	30 Q	33.33
15	Gherkins	48000	72000	20 MT	35 MT	42.86
16	Turmeric	45000	70000	5 MT	8 MT	37.50
17	Coriander	32000	48000	87000 Bundles	125000 Bundles	43.68
18	Banana	56000	115000	75 MT	110 MT	46.67
19	Sugarcane	75000	99000	150 MT	250 MT	66.67
20	Chrysanthemum	55000	78000	20 MT	25 MT	25.00
21	Golden rod	77000	97200	15000 Bunches	25000 Bunches	66.67
	Average	49600	76000			

Source: Directorate of Extension Education & Nodal Officer (TNPFP)

The practicing of precision farming not only the farmers of these two districts, but the farmers of the other districts who were taken too were amazed by what they saw. The farmer-to-farmer mode added strength to the outcome, and all the other districts of the state made a demand for implementing the project.

Economic and Yield Impact

The yield different between the TNPFP farmers and non-project farmers in all crops, the present increase in net returns was positive. The percentage increase in net returns ranged from 43 per cent to 221 per cent among the crops grown. In general, the profit margin was higher in all the crops under TNPFP. This was achieved by increased yield and reduced labour cost particularly for irrigation and weed management. Besides higher yield, improvement in quality of the produce was also visualized. The yield under precision farming and national average yield is given in table below.

Table – 4 Details of Yield of Precision Farming and National Average

Sl.No	Crop	Yield	Tones/HA	Increase %
		National Average	Precision Yield	
1	Tomato	17.35	150	764.55
2	Chilli	12.02	35	191.18
3	Brinjal	10.46	156	1334.03
4	Ladies Finer	6.28	16	154.78
5	Tapioca	25.52	52	103.76
6	Turmeric	4.95	9	81.81
7	Sugarcane	80-100	250	177.77
8	Cotton	15-20Quintal	30Quintal	111.43
9	Watermelon	12.71	60	372.06
10	Ash Gourd	21.95	40	82.23
11	Onion	11.32	21	85.51
12	Banana	28.58	110	284.88
13	Cabbage	14.38	120	734.49
14	Cauliflower	14.22	33	132.06
15	Pumpkin	11.91	50	319.81
16	Bitter gourd	6.23	15	140.77
17	Ribbed gourd	15.85	34	114.51
18	Bottle gourd	12.21	66	440.54
19	Cucumber	6.48	20	208.64
20	Beans	5.8	12	106.89
21	Beetroot	16.75	35	108.95
22	Rose	101k stems	25lk stems	150.00
23	Marigold	10	25	150.00
24	Chrysanthemum	8-15	25	117.39

Source: TNPFP

Mega Demonstration of Cluster Farming in Kavunji

After the success of Tamil Nadu Precision Farming Project (TNPFP) introduction of a mega cluster project bringing 1,196.56 acres irrigated rain fed and waste land under cultivation together at an estimated cost of Rs. 7.77crores. A total of 1,497 farmers are benefited in Kavunji at Kodaikanal, Tamil Nadu. The all farmers associated in the form of cluster were produced potato, carrot, peas and beans in large scale adopting with the latest techniques of precision farming. The department of horticulture supported for field preparation, installed drip, fertigation system, community nursery, and supply of inputs for cultivation of vegetables, the agro engineering department was created water structure, including 19 ground level reservoirs to store water dram from pipes from the konalaru river and provided pumping facilities to irrigate the entire project area. Further, six collection vehicles and 5,000 plastic creates at a cost of Rs. 92 lakhs was also be given to the farmers. Financially government supported at Rs. 65,000 per hectare and farmer contribution at Rs. 40,000 was arranged through co-operative bank now farmers were able to produce crops throughout the year. The ultimate aim was to enhance income of farmers and make it as sustainable one.[9]

Demonstration Effect in Agriculture

According to Dusenberry demonstration effects are effects on the behavior of individuals caused by observation of the actions of others and their consequences (Duesenberry, 1949)[10]. The term was describing the fact that developments in place will often act as catalyst in another place. Countries and local governments often adopt laws and economic policies similar policies in order to emulate that success. It also affects on the behavior of individuals cause a low observation of others. In agricultural economics, demonstration effects may help explain the spread of new form of farm production which gave more remuneration. Farmers do not always know everything about the present technology available of the country. However, they may question about any of the new technology with other neighbor adoption policies.

[9] Raju. K (2008), Kavunji to Adopt PrecisionFfarming, The Hindu.
[10] Dusenberry, J.S. (1949), Income, Saving and the Theory of Consumer Behavior, Harvard University Press, Cambridge P. 27

TN IAMWARM

Improved performance in agriculture and related fields is the key to unlock the tremendous potential of the rural areas of Tamil Nadu. In this direction, Tamil Nadu Irrigated Agriculture Modernization and Water Bodies Restoration and Management (TN IAMWARM) is a unique World Bank has assisted a project implemented with the prime motive of maximizing the productivity of water leading to improved farm income and products with inbuilt precision farming system. The project is to be executed over 6 years starting 2007 with the outlay of Rs. 2547 crores.

Broader objective of the project is to achieve sustainable economic growth as well as poverty alleviation through maximizing productivity of water. The IAMWARM project was support the investment of the following specific objectives

1. Improving irrigation service delivery including adoption of modern water saving irrigation technologies and agricultural practices
2. Agricultural intensification and diversification
3. Balancing market access and agribusiness opportunities
4. Strengthening institutions dealing with water resources management
5. Large scale adoption of drip fertigation of precision farming technologies in field crops, commercial crops and horticultural crops
6. Provide necessary training through various centres like KVK, research stations of TNAU, to the farmers and others stakeholders for capacity building.
7. The project seeks to converge Water Resource Organisation, Agriculture, Horticulture, Agricultural Engineering, Agricultural Marketing, TNAU, Animal Husbandry and Fisheries Departments and Government of Tamil Nadu as the nodal agency. TNAU has started the line departments implementing TN-IAMWARM project, it was primarily concentrated on the transfer of water saving improving production technologies of major crops of the respective area. Under this project, 63 selected sub basins are to be covered a period of six years (2007 - 2013).

Table – 5 Details of TN IAMWARM

Year Wise Implementation

Sl.No	Phase	Year	No.of.Sub basins
1	Phase I	2007 – 08	12
2	Phase II	2008 – 09	14
3	Phase III	2009 – 10	37
4	Phase IV	2011 - 12	-

Source: tniamwarmtnau.org/iamwarm

Out of the 63 sub basins included in the project 12 sub basins was initiated in the first year, 14 sub basins in the second year and the remaining 37 in the third year with management support and co-ordination provided by the multi disciplinary project unit (MDPU) the project commences from the financial year 2007 – 08.

Under the IAMWARM project the training gave to the farmers to know how the precision farming technologies through the project period from 2007 – 08. The numbers of farmers benefited from the training given in the below table

Table – 6 Details of the Year Wise IAMWARM

Training Given to the Farmers and Costs

Sl.No	**Block**	**2008-09**	**2009-10**	**2010-11**	**2012-13**	**2013-14**	**Total No's**
1	Krishnagiri	50	100	25	-	16	191
2	Hosur	75	100	50	-	74	299
3	Kelamangalam	50	-	-	-	-	50
4	Soolagiri	50	75	100	-	75	300
5	Vepanapalli	25	75	125	125	16	366
	Total	250	350	300	125	181	1,206
	Percentage (%)	(20.72)	(29.02)	(24.88)	(10.36)	(15.00)	(100.00)
	Amount	50,000	70,000	50,000	25,000	37,500	2,32,500

Source: Assistant Director, Horticulture Department of Krishnagiri

The above table shows that the number of farmers given training under the TN-IAMWARM project from the period of 2008 – 09 to 2013 – 14. Per head cost of the training Rs. 200 for the individual farmers and thus the total amount Rs. 2,32,500 spend under the project with the total number of beneficiaries 1,206.

Table – 7 Details of TN- IAMWARM Demonstration, Impact and Sustainability of Farmers & Hectare Sub Basin: Pennaiyar Block: Krishnagiri Tank: Alapatti

Sl. No	Monitoring Period	Demonstration		Impact		Sustainability	
		No.of. Farmers	Total Area (in Ha)	No.of. Farmers	Total Area (in Ha)	No.of. Farmers	Total Area (in Ha)
1	Oct 2008 – Mar 2009	39	26	3	1.5	17	16
2	Oct 2009 – Mar 2010	65	24	17	4	134	40
3	Oct 2010 – Mar 2011	12	9	2	2	118	30
4	Oct 2011 – Mar 2012	-	110	-	110	-	448
5	Total						

Source: Assistant Director of Horticulture, Krishnagiri

As observed in table 7 that the demonstration conducted by the department official of the project at Krishnagiri block, in Pennaiyar river sub basin, Alapatti tank in Krishnagiri district reveals that the initial demonstration implemented in the period of October 2008 to March 2009 with the 39 farmers and covered 26 hectare. The impact derived from the demonstration which is 3 farmers and an area with 1.5 ha. However, the sustainability with the precision farming technologies for the crop production 17 farmers and 16 ha area was practiced in the initial period. The consistence of the demonstration in the second year period from October 2009 to March 2010 with 64 farmers and 24 ha covered. This impact relatively higher than the first year which is 17 farmers with 4 ha impact taken place due to demonstration. However, the sustainability is very important aspect to measure the success or failure of the precision farming in the implemented area hence 134 farmers with 40 ha coverage shows that the real demonstration effects on farmers are adopted and sustained with precision farming through the year with various multi crops cultivated by the farmers because of higher yield, least inputs and more than that huge income from the farm. Followed by the last year Oct 2011 to Mar 2012 the

total area of demonstration covered 110 ha and the impact also 110 ha with the overall demonstration which spread across the area with the total sustainability area is 448 ha.

Table – 8 Details of TN- IAWARM
Demonstration, Impact and Sustainability
of Average Yield (Kg/Ha) for selected crops

Sl.No	Crop Name	Average Yield (Kg / Ha)		
		Demonstration	Impact	Sustainability
1	Bhendi	10000 (100.00)	8000 (80.00)	9000 (90.00)
2	Banana	53000 (100.00)	45000 (84.90)	48000 (90.56)
3	Jasmine	4500 (100.00)	4300 (95.55)	4500 (100.00)
4	Tomato	28000 (100.00)	24000 (85.71)	26500 (94.64)

Source: Assistant Director of Horticulture, Krishnagiri

The above table shows that the selected crops yield under the project demonstration, impact yield of the crops and finally the crops with sustained yield by practiced of the farmers in the project implemented area.

Major Findings of the Study

1. The government of Tamil Nadu has undertaken the task of implementing the Tamil Nadu Precision Farming Project (TNPFP) through the Tamil Nadu Agricultural University (TNAU). The project covered 400 ha with the main focus on 40 – 60 per cent enhanced yield and effective market linkage.
2. Tamil Nadu Precision Farming Project (TNPFP) was implemented initially for a period of three years on 250 acres in 2004 – 05, and then in 500 acres in 2005 – 06 and 250 acres in 2006 -07 and totally 700 farmers with 400 ha were covered. This project was implemented with a total budget of Rs. 720 lakhs for a period of three years. An amount of Rs. 75,000 for the installation of drip irrigation and Rs. 40,000 for crop production

expenses was given to each farmer. One unit is equivalent to one hectare and a farmer is eligible for one hectare only.

3. Found that after seeing the success of the first 100 farmers and the high market rate for the produce obtained from this scheme, farmer started registering in large numbers during the second year (with 90 per cent of subsidy) and the third year (with 80 per cent of the subsidy). Within a short period, the farmers were enjoying yields that were 3 to 12 times higher than that of normal. They were also conserving water and spending less money on labour.
4. The percentage increase in net returns ranged from 43 per cent to 221 per cent among the crops grown. In general, the profit margin was higher in all the crops under TNPFP. This was achieved by increased yield and reduced labour cost particularly for irrigation and weed management. Besides higher yield, improvement in quality of the produce was also visualized.
5. A total of 1,497 farmers are benefited in Kavunji at Kodaikanal, Tamil Nadu. The all farmers associated in the form of cluster were produced potato, carrot, peas and beans in large scale adopting with the latest techniques of precision farming. The ultimate aim was to enhance income of farmers and make it as sustainable one.
6. TN-IAMWARM project from the period of 2008 – 09 to 2013 – 14. Per head cost of the training Rs. 200 for the individual farmers and thus the total amount Rs. 2,32,500 spend under the project with the total number of beneficiaries 1,206.

Conclusion

The success of the first 100 farmers and the high market rate for the produce obtained from the scheme Tamil Nadu Precision Farming Project (TNPFP) farmers started registering in large numbers during the second year (with 90 per cent of subsidy) and the third year (with 80 per cent of the subsidy). Within a short period, the farmers were enjoying yields that were 3 to 12 times higher than that of normal. They were also conserving water and spending less money on labour. The percentage increase in net returns ranged from 43 per cent to 221 per cent among the crops grown. In general, the profit margin was higher in all the crops under TNPFP. This was achieved by increased yield and reduced labour cost particularly for irrigation and weed management. Besides higher yield, improvement in quality of the produce was also visualized.

Refernces

Ancha Srinivasan, (2006), Handbook of Precision Agriculture, the Haworth Press, Inc, doi: 10.130015627_18, Pp No. 513-14.

Anonymous (2007), India-US Knowledge Initiative on Agriculture-work Plan http://www.icar.org.in.

Anonymous (2007), National agricultural innovation project launched. http://www.dare.nic.in.

Anonymous. (2007), Ongoing today: 1998 to 2004. http://www.mssrf.org.

Dusenberry, J.S. (1949), Income, Saving and the theory of Consumer Behavior, Harvard University Press, Cambridge P. 27.

Raju. K (2008), Kavunji to Adopt Precision Farming, The Hindu.

Ray et. al., (2001), Precision Farming in Indian Context. GIS @ Development, Pp. 7.

Shanwad et al., (2004), Precision Farming Dreams and Realities for Indian Agriculture in Proceeding of 7th Annual International Map India Conference, New Delhi, India. Available online at: http://www.gisdevelopment.net/application/agriculture /overview /mi04115.htm.

Shanwad et al., (2006), Precision Farming: Dreams and Realities for Indian Agriculture http://www.GISdevelopment.net.

Swain et al., (2004), Precision Agriculture for India: Potential, Prospects and Strategies. Presentation at 38 Annual Convention and Symposium of Indian Association of Agricultural Engineers (ISAE), Dapoli, Maharashtra, India.