TAMIL NADU AGRICULTURAL UNIVERSITY

PROCEEDINGS

8th SOCIAL SCIENCES SCIENTISTS' MEET
(10.6.2020)

Lead Centre

Centre for Agricultural and Rural Development Studies
Tamil Nadu Agricultural University
Coimbatore-641003

Directorate of Research

Tamil Nadu Agricultural University
Coimbatore 641 003

2020

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PROCEEDINGS

8th SOCIAL SCIENCES SCIENTISTS' MEET HELD 10thJUNE 2020

The 8th Social Scientists' Meet was conducted on-line on June 10, 2020 involving 40 scientists off-line and more than 120 scientists on-line spread across various colleges and research stations. **Dr. N. Kumar,** Vice Chancellor, TNAU, Coimbatore, inaugurated the event and offered his initial remarks. He insisted that every social scientists should have one university research project or externally funded project other than teaching responsibility. **Dr. K.S. Subramanian,** Director of Research flagged off few issues for consideration by social scientists that include impact studies of COVID 19 on Agriculture & Horticulture, modified supply chain management, ICT / IOT / AI tools for on-site detection of field problems, strategies for doubling the farmers income, linking Remote Sensing in Crop Insurance besides attracting youth in agriculture. Further, he emphasized that a special drive is required to increase the number of patents filed / awarded to improve institutional ranking of NIRF or ICAR.

Dr. K.R. Ashok, Director (CARDS) presented the current status of research and highlighted the outcome of social research team for the year 2019 - 2020. **Dr. D. Sureshkumar**, Prof. & Head, Dept. of Agricultural Economics, **Dr. P. Balasubramanian**, Prof. & Head, Agricultural Extension & Rural Sociology and **Dr. Venkatesa Palanichamy**, Prof. & Head, Agriculture & Rural Development, presented the action plan for the upcoming year 2020-2021.

The Vice Chancellor during his concluding remarks emphasized that scientists should propose externally funded projects to improve the quality of research and publications. The Director of Research said that there can be dedicated Grantsmanship to ensure all will have internally or externally funded projects.

I. CENTRE FOR AGRICULTURAL AND RURAL DEVELOPMENT STUDIES (CARDS)
A. Key findings of completed projects
Externally funded projects

NPC/CARDS/CBE/AEC/2018/E001

Monitoring and evaluation of medicinal plants cultivation during 2013-14 to 2015-16 for Farmers level survey on medicinal plants cultivation in the state of Tamil Nadu

(Dr. M. Chinnadurai, Dr. K. Chandran, Dr. S. Muraligopal, Dr. V. Karthick, Dr. P. P. Murugan, Dr. M. Prahadeeswaran, Dr. A. Sundar, Dr. A. Rohini, Dr. S. Varadharaj, Dr. S. Kanaka)

NMPB supported through the Department of Horticulture & Plantation Crops for cultivation of medicinal plants by organising the farmers in cluster approach. Majority of the farmers partially converted their land holding for medicinal plants cultivation and also it is interesting fact that, farmers turned out to medicinal plants cultivation from traditional cash crops like paddy, cotton, ground nut, pulses, vegetables and flower crops. Very few farmers have totally turned for medicinal plants cultivation. Farmers have raised the crop in the 100 per cent approved area.

No loans were given for cultivation except the subsidy. The average size of total land holding was 1.41 ha. Out of 1.41 ha, 0.47 ha have cultivated the medicinal plants (About 33% of total land holding) The mean survival rate of the medicinal plants was 87 per cent. Assistance provided for planting materials of medicinal plants ranged from Rs. 2000 /ha to 8000 /ha depending on the nature of the species. The fund received was utilized fully for the medicinal plants cultivation. Most of the farmers sold that the harvested produce through local traders.

The subsidy was released to the farmers through online bank transfer. It is understood that farmer was happy with the mode of fund allocation and method of issuance. Most of the farmers produced the quality planting materials by their own and used for cultivation. Some of the farmers have received from the NMPB nursery established from this project and minimum quantityl received from other resources. State Departments and Research Station have helped the farmers by extending the technical support through various means *viz*., awareness programmes, training, demonstrations, field visits etc. The grants received by the farmers and by the government were full utilized (100 per cent) for the medicinal plants cultivation.

Policy recommendations:; Promotion of clusters through formation of new clusters may be encouraged, Establishment of processing facilities like threshing floor,

processing centres, tarpaulin and storage structures like godownsetc.Marketing channels have to be assessed and Minimum Support Price to their produce to be ensured.More live demonstrations may be conducted by the State Department and partly by the Research Institutions to the farmers.More extension programmes like training may be offered to the farmers on production systems especially pollination mechanisms / strategies and plant protections measures which is being one of the important problems to the farmers.

B. Action Plan (2020-2023)

Project 1: NADP (Coordination) project: Implementation and Evaluation of National Agricultural Development Programmes

Name of the Scientists and Centre	2020-21	2021-22	2022-23	Deliverables/ expected output
Dr. K.R. Ashok Dr.M.Prahadeeswaran	• Inviting new project proposals and scrutiny of proposals • Preparation of notes for SLSC • Periodic progress report to TAWDEVA • Reports on audit para • Preparing notes and attending the review by the Vice-Chancellor and APC & PS • Geo-tagging of assets created under NADP	• Inviting new project proposals and scrutiny of proposals • Preparation of notes for SLSC • Periodic progress report to TAWDEVA • Reports on audit para • Preparing notes and attending the review by the Vice-Chancellor and APC & PS • Geo-tagging of assets created under NADP • Facilitating the evaluation of NADP	• Inviting new project proposals and scrutiny of proposals • Preparation of notes for SLSC • Periodic progress report to TAWDEVA • Reports on audit para • Preparing notes and attending the review by the Vice-Chancellor and APC & PS • Geo-tagging of assets created	• Value of assets created under NADP • Benefits to the farmers, scientists and students

	• Facilitating the evaluation of NADP projects • Assessing the impact of NADP projects	projects	under NADP • Facilitating the evaluation of NADP projects	

Name of the Scientists and Centre	2020-21	2021-22	2022-23	Deliverables/ expected output
Project 2: Developing and Disseminating Market Advisories for TN - IAMP Basin crops				
Coimbatore Dr.K.M.Shivakumar Dr.S.Selvam Dr.A.Rohini Dr.M.Prahadeeswaran Dr.D.Murugananthi Dr.R.Parimalarangan	ARMA, ARIMA, ARCH, GARCH, ANN models for generating pre sowing and pre harvest market advisories.			Provide price forecasts and market intelligence for select six commodity to basin farmers

Project 3 : Economics of Agricultural Production and Planning				
	2020-21	2021-22	2022-23	Deliverables/ expected output
Dr K.R. Ashok Dr.M.Pragadheeswaran	Collection of data from producers, consumers and creameries in Tamil Nadu, Kerala, Karnataka, Andhra Pradesh and Telanagana	Computerization and analysis of data Preparation and submission of report	-	Marketable and marketed surplus of milk and milk products in different states Market channels and system of flow of milk and milk products to end consumers

Project 4 : A Study on Evaluation of Social and Economic impacts of TNAU Varieties and Technologies				
Dr.K.R.Ashok, Director CARDS and 11 core team members.	Data Collection Data Analysis Report Submission			Assessment of impact of TNAU technologies on resource use, production, farm income, and social aspects Identification and documentation of technologies and varieties released by TNAU,

C.Details of research projects

A total of 5 numbers of projects were reviewed. Out of which, one externally funded project was completed and four projects are ongoing.

Depts.	**Externally funded projects**		**Core projects**		**University sub projects**		**Total**	
	Completed	**Ongoing**	**Completed**	**Ongoing**	**Completed**	**Ongoing**	**Completed**	**Ongoing**
I. Centre for Agricultural and Rural Development Studies								
Coimbatore	1	3	..	..	..	1	1	4

D.Remarks of the ongoing projects					
S. No	**Project No.**	**Project Title**	**Project Period**	**Project Leader (PI/Co-PI)**	**Remarks**
a.	**Externally Funded Projects**				
1	NADP/CARDS/ CBE/AEC/2019/ R019	Implementation and Evaluation of National Agricultural Development Programmes	Continuous	Dr. K.R. Ashok Dr. M.Prahadeeswaran	Project may be continued

D.Remarks of the ongoing projects					
S. No	**Project No.**	**Project Title**	**Project Period**	**Project Leader (PI/Co-PI)**	**Remarks**
2	DPC 241501120 PF 0934	Developing and Disseminating Market Advisories for TN - IAMP Basin crops	2017-24	Dr. K.M.Shivakumar Dr. S.Selvam Dr. A.Rohini Dr.M.Prahadeeswaran Dr. D.Murugananthi Dr. R.Parimalarangan	Project may be continued
3	New Project	Estimation of Production and Utilization Pattern of Milk and Milk Products in India		Dr. K.R. Ashok Dr.M.Prahadeeswaran	Project may be continued
b	**University Funded Project**				
1	FMC/CARDS/ CBE/CAR/2019 /R001	A Study on Evaluation of Social and Economic impacts of TNAU Varieties and Technologies	1-8-2019 to 31-7-2020	Dr. K.R.Ashok & Team	Project may be continued

II. AGRICULTURAL ECONOMICS

A. Key findings of completed projects

NCAP/ CARDS/ CBE/AEC/ 2017/ R017

Resource Use Planning for sustainable agriculture in Tamil Nadu (Dr.D.Sureshkumar, Dr.K.R.Karunakaran, Dr.S.Muraligopal, Dr.M.Chinnadurai)

The optimal plan revealed that though the gross cropped area has declined from the existing area of 43.07 lakh ha to 37.52 lakh ha under scenario I (technologies such as SRI, SSI, Bt cotton and tissue culture banana and 38.18 lakh ha under scenario II (drip irrigation technology). The net income has increased by 43 percent increase from Rs.218.64 billion to Rs 313.22 billion under scenario I and 315.12 billion under scenario II.

Decline in area under cereals, pulses and oil seeds are replaced by commercial crop and vegetables. Wider adoption of yield increasing and water saving technologies help in increased income. Hence, technologies such as SRI, SSI, tissue culture banana, BT cotton etc., are to be promoted in a larger scale. Efforts have to be taken particularly in CD and NE zone to increase the productivity of pulses and oilseed through water saving and yield enhancing technologies like sprinkler irrigation system.

In all the optimal plans, area under vegetables had increased and per ha net return also increased. Use of more hybrid seed production and necessary technology for protected vegetable cultivation of vegetable may be promoted an selected districts. Tailored made technology and credit support programmes may be formulated to increase net return per unit area of land.

NSUSA/ACRI/VVR/ECO/2019/R002 Supply and Demand for Urban Public Goods – The Case of Municipal and Environmental Services from Urban Lakes (Tanks) in Coimbatore District (Dr.R.Balasubramanianand Dr.D.Suresh Kumar)

This study examines resident preferences for lake restoration in Coimbatore, India, a 'Smart City' selected to be part of a national urban development program. Based on a gender-stratified survey of Coimbatore residents (N=1,865), tentative results suggest that a majority of residents are dissatisfied with environmental quality in the city along a number of dimensions and think improvements are important. Yet, relatively few respondents are willing to donate money to restore the city's heavily degraded lakes.

In particular, women reported lower willingness to donate than men, despite being as concerned about the status of the lakes and urban environmental quality overall. The half of the sample randomly assigned to receive messaging focusing on both the ecological and recreational benefits of lake restoration also reported significantly lower values than those told about the recreational benefits only. These responses appear to reflect contextual issues, such as expectations about government responsibility for public goods provision, cash constraints, and women's limited access to household funds.

Thus, engaging the public in urban environmental planning and action will require attending to varied cultural norms regarding the role of the government versus private organizations and households and the gendered nature of transactions.

CIL/CARDS/CBE/AEC/2019/R018

A Study on Participatory Behaviour of Rural Households in Neem Seed Collection in Tamil Nadu

(Dr.D.Suresh Kumar and Dr.A.Vidhyavathi)

It is found that ninety-seven percent of the neem seed collectors are above 30 years. Out of which 55, percent of them belong to middle age category (30-50 years) and 42 per cent of the collectors are above 50 years old. Being less laborious activity, the neem seeds are mostly collected by female rural mass. Of the total 450 respondents, around 92 percent are female and only 8 per cent are male. It is mainly due to the fact that the male labourers prefer to go for other agricultural and non-agricultural wage employment as they have comparative advantage in wages.Majority of the neem seed collectors are illiterate mostly belong to the category of more than 50 years and 30 to 50 years. Around 14 per cent of the neem seed collectors completed middle school followed by 13 per cent completed secondary education.

The analysis confirms that agriculture based households' members generally involved in neem seed collection. It is evidenced that majority of the neem seed collectors (61 per cent) collect neem seeds in local village itself. Around 26 per cent of the respondents visit nearby villages to collect neem seeds. To collect neem seeds, the rural households travel 4.65 km daily, with a minimum of 2.0 km and maximum of 7.0 km in a day. Around 79 per cent of the neem seed collectors travelled a distance of 3-5 km per day to collect neem seeds, followed by 16 per cent travelled more than 5 km per day.

The mode of transport is mostly public transport (60 per cent), followed by walk (35 per cent) and own transport or along with neighbours (5 per cent). During the survey, the neem seed collectors revealed that better transportation facilities will

help them to collect more quantity of seeds also will help reduce drudgery in walking distance places.

Constraints in neem seed collection: Neem seed collection is a time consuming and ranked first as evidenced from highest mean score. The other constraints are to travel long to collect seeds, less remunerative, less productive, poor health, socially less dignified, and lack of source for neem seed collection.

Extraction of neem seeds from collected fruits:

The neem seed collectors collect neem seed by different ways such as (i) wind fallen fruits, (ii) harvested fruits and (iii) from bird droppings. After collecting, the fruits, they are being processed before selling in the market. Unhygienic storing and packing of neem seeds led to poor quality and infected seeds with Aflatoxin. This fetches poor price to the neem seed collectors.

Neem seeds Sale:

Neem seed collectors sell their collected neem seeds either at doorsteps or shops/mandis in the local village or nearby towns. Around 59 per cent sell their seeds at shops/mandis either in the local village itself or nearby towns, whereas 41 per cent sell their seeds to village traders at doorsteps.

The major constraints in selling include poor price offered by the traders, followed by lack of awareness about price prevailed in other markets, lack of awareness about quality, malpractices in weights and measurements, malpractices in prices, collusion among the traders and oil millers.

Impact of neem seed collection on employment and income:

The peak bearing period is three months from June, July and August, when the rural people actively involved in collecting neem seeds. During the peak months, on an average 15 days to 26 days per month the rural people engaged in neem seed collection.

The neem seed collectors could be able to collect 4 to 8 kgs of neem fruits/seeds per day. The annual income earned by the rural population during the peak season period varies from Rs. 6237/annum in Singampunari to 28 Rs.13100/annum in Pennagaram block.

It is evident that the rural people engaged 97 days in year for neem seed collection which accounts for 41 per cent to the total number of days employed. However, they could earn only Rs.7468/annum which accounts only around 5 per cent of the total income. This clearly indicates that the neem seed collection is less remunerative and not attractive financially.

Majority of the neem seed collectors are illiterate mostly belong to the category of more than 50 years and 30 to 50 years and they were female. Hence, adequate training through awareness creation campaigns will help them to

understand the importance of the bio-resource, effective utilization of the available natural resource (ie. neem seed), diversify their livelihood activities and increase income.

The analysis confirms that agriculture based households members generally involved in neem seed collection. Hence, these households in the rural areas may be identified and supported for their livelihood.

It is expressed by most of the neem seed collectors that the collection of neem seeds will be increased by thirty percent with better transport facilities.

As neem seed collection is a time consuming, laborious and needs good health conditions, support in the form of transportation and health insurance may be ensured.

Conducting proper awareness and capacity building programmes will help the neem seed collectors to supply good quality seeds.

Programmes like price support, market intervention in the form of price dissemination, market and transport infrastructure will help the rural people to fetch better price for their collected neem seeds.

The present study conclusively suggests that a detailed study covering the entire state may be taken up to understand and study in detail the value chain involved in neem seed industry, marketing cost and margins, market potential including economics of neem seed collection and processing. This will help the Corporates like Coromandel to make right investments on neem industry and make it a viable one.

University Research Sub Projects

CARDS/CBE/AEC/2018/001 Comparative Economic Analysis of Irrigated and Rain fed Farming Systems in Tamil Nadu (Dr.A.Vidhyavathi)

The compound growth rate was worked out for different groups of crops under irrigated condition in Tamil Nadu. The cereals showed decreasing growth rate from 1980-2000 and its growth rate was increasing during 2000-2015. The growth rate of sugar crops almost remained constant over the years.

The growth rate of oilseeds which has been increasing from 1980-2000 has decreased during 2000-2015 but still it was positive. The compound growth of pulses, fibre crops, green manure showed increasing trends whereas area of cereals, sugar crops, oilseeds, fodder showed decreasing trend under unirrigated condition in Tamil Nadu from 2003 to 2015.The area under unirrigated condition was decreasing

in almost all horticultural crops except fruits which showed increasing growth of 0.15 per cent from 2003 to 2015.

The area under unirrigated cultivation was decreasing in almost all horticultural crops except fruits which showed increasing growth of 0.15 per cent from 2003 to 2015. The growth of area under cereals under irrigated condition showed decreasing trend in districts like Coimbatore, Perambalur, Kanyakumari. Major districts showed decreasing growth rate in green manure crops whereas it showed increasing trend in Thiruvallur district. The gross irrigated area condition showed decreasing trend in almost all districts of Tamil Nadu. The trend of unirrigated area was increasing in districts like Dharmapuri, Namakkal and Ariyalur.

The crop diversification index showed medium category of crop diversification in Thanjavur and Thiruvarur districts whereas Dharmapuri and Krishnagiri districts showed high crop diversification. Major crops grown in irrigated farms were paddy, groundnut, pulses and Gingelly. Major crops grown in rainfed farms were Cholam, Ragi, Horse gram, Red gram and Groundnut.Yield sustainability index was high for Gingelly followed by Groundnut and it very low for Paddy in Thanjavur and Thiruvarur districts. Yield sustainability index was high for Ragi and Horse gram in Dharmapuri and Krishnagiri districts.

More than 50 per cent of the farmers were small farmers having an average farm size of 1.4 ha followed by marginal farmers with an average farm size of 0.7 ha under irrigated condition. Nearly 90 per cent of the farmers were marginal farmers having an average farm size of 0.97 ha followed by small farmers with an average farm size of 2.8 ha under rainfed condition.

Resource Use Efficiency of Irrigated Farms

The co-efficients of seed and plant protection chemicals were positive and significant at one percent level with the values 0.35 and 0.03 respectively.The co-efficient of FYM and potash were found to be positive and significant at five percent level with the value of 0.04 and 0.02 respectively. The co-efficient of volume of irrigation was found to be negative and significant at five percent level with the value of -0.20. The coefficients of Nitrogen, phosphorous, human labours, machine labour were found to be insignificant.As regards the economic optima, MVP (Marginal Value Product) worked out for the inputs such as seed, Potash and volume of irrigation were less than MIC (Marginal Input Cost), which indicated that the resources were over utilized and there exists a possibility for increasing the yield of paddy by decreasing the respective inputs from the existing mean level where as FYM and Plant protection chemicals MVP were greater than MIC, which indicated that the resources were underutilized.

Resource use efficiency of rainfed farms

The regression co-efficient of Nitrogen (0.4245) and Phosphorus (0.2415) were found to be statistically significant at one per cent and five per cent respectively. Whereas the regression coefficients of Seed (-0.5081), Human labour (-0.5748), Bullock and machine labour cost (-0.4992) and Farm yard manure (0.0802) were non significant. Nitrogen and Phosphorus were underutilized and seeds were overutilized in rainfed farms.

Technical Efficiency

More than 70 percent of the irrigated farms were with technical efficiency of 0.63 and the mean technical efficiency of the irrigated farms was 0.67.More than 85 per cent of the rainfed farms were with technical efficiency of 0.82 and the mean technical efficiency of the rainfed farms was 0.83.Level of technology adoption had positively and significantly influenced technical efficiency of both irrigated farms and rainfed farms.

Technology Adoption in Irrigated Farms

The average technology adoption of paddy farmers was 31 per cent. The technologies adopted were high yielding varieties (97 per cent of farmers), mechanization (78 per cent farmers), application of pre-emergence herbicide (50 per cent farmers) and alternate wetting and drying (27 per cent farmers).The average technology adoption of groundnut farmers was 40 per cent. The technologies adopted were gypsum application (82%), use of High yielding varieties and foliar spray (27%) and use of machinery for sowing (9%).The average technology adoption of pulses farmers was 47%. The technologies adopted were application of 2% DAP spray (100%), gap filling practice (56%), adoption rate of High Yielding Variety (44%) and uses Rhizobium for seed treatment (33%).The first and foremost constraint faced by irrigated farmers was lack of awareness of techniques followed by fragmentation of lands in the sense that those marginal land holders could not utilize machineries for land practices.

Technology Adoption in Rainfed Farms

The level of technology adoption of Ragi farmers was 38 per cent.The technologies adopted were adoption of high yielding varieties (90 per cent), soil testing and Intercropping (40 per cent), seed treatment with Azospirillum (15 per cent) and summer (5 per cent). The level of technology adoption of pulses farmers was 47 per cent. The technologies adopted were adoption of high yielding varieties (83 per cent), seed treatment (67 per cent), intercropping (67 per cent), foliar spray and sowing with machinery (17 per cent). The level of technology adoption of groundnut farmers was 47 per cent. The technologies adopted were adoption of drought tolerant variety (100 per cent), foliar spray (71 per cent), soil and water conservation measures and gypsum application and earthing up operations 43 per

cent), seed treatment & intercropping (29 per cent and sowing with machinery (14 per cent). The first and foremost problem faced by the rainfed farmers was the monsoon failure ie., inadequate rainfall followed by uncertain price of the produce and labour scarcity.

CARDS/CBE/ AEC / 2018 /001 Impact of Joint Liability Group (JLG) Finance on Rural households in Tamil Nadu (Dr.M.Anjugam)

Socio-Economic Status: The average age of the JLG members was around 40 years and are medium aged. Sample JLG members are women. Average workers per family was 2.70 and 87 percent of them were educated and of which, eight per cent of them were graduates / diploma holders. Nearly 77 per cent of the landless households and 23 per cent of the marginal farmers were participated in the JLG programme (average farm size of 0.91 ha). Non-farm workers accounted for 45 per cent, followed by agricultural labourers (32 per cent) and small and marginal farmers (23 per cent). They joined JLG mainly for availing loan for income generating activity followed by getting easy access to loan and for improving their income.

JLG functions: Age of the JLG was about 4.5 years and the JLGs are only credit groups not the saving groups. Saving by members is only optional. The JLG linkage model is as follows.

$$Tamil\ Nadu\ Grama\ Bank\ (RRB) \rightarrow NGO\ (Intermeadiary) \rightarrow JLG$$

Tamil Nadu Grama Bank – a Regional Rural Bank is involved in JLG financing and sanctioned loan to NGO @12% interest and NGO in turn gives loan to JLG members @15%. The average loan per member was Rs.90000 in three loans.

47 percent of them availed cattle loan (milch cow) and 57per cent of them for petty business (nonfarm activities) which is for traditional activities and *not* followed any new activities / started through training or so. 100 per cent repayment was achieved in JLG loan.

There exists a positive impact on generation of employment and income in post JLG period and not much impact on asset creation in the form of household assets, liquid assets (savings in FD/ RD), investment in terms of LIC policies etc., other than livestock. Nearly 80 per cent of them had Rs.500-1000 per month as savings after joining JLG. Nearly forty-two percent of them are having old debts from informal sources particularly money lenders and other MFIs.

Access to credit with low interest is the major benefits realized by the members in availing loan from JLG and asset creation was assured. Low amount of loan sanctioned per time may be the most important constraint followed by no flexibility in repayment.

Policy suggestions are i) NGOs may educate the JLG members to avail Insurance policies for family members for protecting themselves from risks, in availing various benefits provided by the state and central government to weaker sections, ii) Training on agro based enterprises such as vermicomposting, bio control agents production may be given to the JLG members for undertaking enterprises for enhancing additional employment and income, iii) though savings is not a mandate of JLG, it may be promoted among them with the motivation by bankers.

CARDS/CBE/AEC/ 2018/003
An Economic Analysis of Internalizing External Benefits and External Costs into the Economics of Agro Forestry in Tamil Nadu
(Dr.T.R.Shanmugam)

- Results of social benefits and social cost analysis are calculated and given. BCR calculated at the highest value 8.33 for teak with maize growers whereas in Teak alone it was 7.86.
- BCR worked out to 3.25 for tamarind with sorghum but it was at 3.21 for tamarind alone.
- Internal rate of return was estimated at 27 percent for teak with maize crop growers, whereas it was 25 per cent, for teak alone.
- IRR has been estimated at 23 percent for tamarind with sorghum crop growers and 21 percent for tamarind growers respectively.
- External benefits are higher in Teak + maize and hence these crops were topping in the social benefit and social cost analysis.
- The results showed that the contribution of agro forestry to the economy should be viewed through a social perspective and intangible benefit measures should be incorporated when calculating total revenue. If the contribution of various intangible benefits of agro forestry systems are properly estimated, the economic valuation of these projects has become increasingly important.

CARDS/CBE/AEC/2018/005 Impact of Credit on Production Efficiency and Capital Formation in Farm Households (Dr.S.PadmaRani)

The study examines the borrowing behaviour of farmers, comparing of cost and returns among borrowers and non-borrowers, and study the problems in getting of loan by the farmers from institutional agencies. Source and amount of borrowing, cost of borrowing were examined. Analysis of data revealed that the average size of borrower farm households is 1.377 ha. Average age of the farmers was found to be 51.82 years having an average of 29.71 years of experience in farming. Majority (44.64 per cent) of borrowers have 10^{th} to Secondary level of Education and

17.84per cent have collegiate and diploma level of education and 25.1 percent of borrowers have up to primary level of education. About 63.64 per cent of sample borrower farmers have non - farm income in addition to income from agriculture and allied activities.

In the study area, Sugarcane, Banana, Paddy, and Turmeric are the major crops grown. The average loan amount borrowed by short term borrowers was Rs.79918.18 per farm. Time lag between applying and sanctioning of loan ranged from 7days to 15 days. About 73.3 percent of farmers revealed that crop loan was inadequate. One-time settlement of credit is followed by all the farmers. Kisan credit card scheme norms were not fully followed.

Cost of credit: The average cost of credit was found to be Rs.631.25 for short term borrowing.

Cooperative bank was found to be the major source of credit (74 per cent) for the small and marginal borrowers.

Inadequacy of loan amount, complex procedures, delay in sanctioning of loan amount are the major constraints faced by borrowers

Easy access to the bank is not possible for small and marginal farmers, Time consuming, high cost of credit, easy access for advance payment from jaggery traders and inadequate collateral security to get loan are the major reasons for not borrowing from the Institutional sources.

Suggestions for improving the credit delivery system:

- Annual renewal of loan should not be warranted instead farmer's smartcard may be provided to facilitate farmers for getting loan
- Timely disbursement of credit is needed
- Banking related information should be publicized in the villages so that every farmer can access institutional agencies for borrowing. All the informations relevant to farmers regarding eligibility, interest rate, scale of finance, subsidy, banking schemes should be given in local languages.
- E-documentation of farm assets and financial details of the farmers will help to speed up the lending process.

CARDS/EKT/AEC/2018/001 Dynamics of Labour Market and its Economic Impact on Farming Sector in Thanjavur District (Dr.S.Angles)

The availability of agricultural labours have reduced to an extent of 58 per cent in the past 10 years. The farmers mitigate the inadequate waged labours through machineries in case of paddy production and they have started using the machineries for transplanting, weeding and harvesting.

Due to inadequate availability and other problems faced due to labours eight 8 per cent of the sample farmers have changed the cropping pattern and moved towards less labour intensive plantation crop in particular to the coconut and other crops such as black gram and sesamumcrops. The labours prefer contract based jobs in the peak seasons and wage during the lean periods

Professional transformation have been observed among the agricultural labours towards other jobs such as construction, petty shops, road side vending of fruits, vegetable, flowers, milk production with one to 2 cows, urban jobs, etc.In the past 10 years the wages have increased to an extent of 143 per cent for male labours and 113 per cent for female labours. The working hours have reduced to 6 hours from 8 hours a day which includes the refreshment breaks.

B. Action Plan (2020-2023)				
Theme No:1	**Title**	**Economics of Agricultural Production and Planning**		
Theme Leader	Dr.K.R.Karunakaran			
Name of the Scientists and Centre	2020-21	2021-22	2022-23	Deliverables/ expected output
Project 1: Comprehensive Scheme for Studying the Cost of Cultivation of Principal Crops in Tamil Nadu				
Coimbatore: Dr.D.SureshKumar Dr. V.Karthick	Collection and compilation of cost data on major crops Collection of input and output price data for major crops	Collection and compilation of cost data onmajorcrops Collection of input and output price dataformajor crops	Collection and compilation of cost data on major crops Collection of input and output price dataformajo r crops	Data on inputs, output, costs, farm inventory and social dynamics Inputsfor implementing pricepolicies
Project 2: A Study on Farm Level Productivity Assessment of Major Horticultural Crops In Tamil Nadu				
Coimbatore Dr.K.R.Ashok Dr.D.Suresh Kumar Dr.A.Vidhyavathi	Data collection Analysis of data Report submission			Impact of Micro Irrigation on yield and income of the horticultural crops Availability and utilization of cold storage facilities

Project 3: Poultry Business School - Income Enhancement through Critical Stages and Interventions during Production and Post-Production.				
Eachangkottai Dr. S. Angles, Dr. K. R. Jahanmohan Dr. V. Saravanakumar Dr.Satish Chandra Pant Dr. C. Mehala,	Data collection Analysis of data Report submission			Identification of interventions in the technologies and marketing of poultry products for enhancing the poultry farmers income
Project 4: A Study of Collective Farming Scheme In Tamil Nadu				
Trichy: Dr.S.D.Sivakumar Dr.S.Selvam, Dr.M.Pragadeeswaran Dr.R.Ramasubramanian Dr.C. Muralidharan Dr.S.Selvanayaki	Final report preparation	..	..	Assessment of social capital formation and roleof leadership in management of FPGs Challenges encountered in FPGs
Project 5: Crop Diversification for Nutritional Security in Tamil Nadu				
Coimbatore Dr. K.R.Karunakaran	Analysis of data Report submission			Development of dietary optimization model
Project 6: An Economic Inquiry into Farmers' Knowledge, Perception and Intensity of Pesticide Use in Major Vegetable Cultivation of Tamil Nadu				
Coimbatore Dr.M.Thilagavathi	Data collection Analysis of data Report submission			Pesticide use, practices and the intensity in major vegetable crops will be documented
Project 7: Structural changes in Rural Employment and Its Implications for Agriculture				
Madurai Dr.A.DanielViswasam Samuel	Data collection Analysis of data Report submission			Impact of rural employment in standard of living among rural households and agriculture

Project 8: Economics of Production and Planning under Risk in the Dry Farming Tracts of Virudhunagar District of Tamil Nadu				
Madurai Dr. D. David Rajasekar	Analysis of data Report submission			Developing risk efficient farm plans with optimum enterprise mixes in dry farming
Project 9: Doubling Farmers Income : An Empirical Analysis on Relationship between Crop Diversification and Farm Income				
Madurai Dr.A.Malaisamy	Data collection Analysis of data Report submission			Drivers of Crop diversification will be identified
Project 10: Socio economic assessment of High Density Planting in Mango and Guava				
Trichy Dr.S.Senthilnathan	Data collection Analysis of data Report submission			Economics of High density planting

Theme No:2	**Title**	**Agricultural Marketing and Price Analysis**		
Theme Leader	**Dr.K.M.Shivakumar**			
Name of the Scientists and Centre	2020-21	2021-22	2022-23	Deliverables/ expected output
Project 1: Institution of Endowment Chair in Agricultural Marketing				
Coimbatore Dr.D.Suresh Kumar,	Commodity reports on marketing of groundnut and gingelly	Commodity reports of important pulses	Commodity r cereals	Commodity reports on marketing of important crops

Project 2: Causes and Consequences of e-NAM on the Economic Development of Indian Agriculture				
Coimbatore Dr.K.M.Shivakumar Dr.M.Prahadeeswaran Dr.N.Kiruthika Dr.S.R.Padma	Data collection Analysis of data Report submission	Data collection Analysis of data Report submission		Discussion with stakeholders Conducting seminars/workshops Preparation of case studies Preparation of policy reports and circulation for discussion
Project 3: Artificial Intelligence & Big Data Analytics in Food & Agriculture				
Coimbatore Dr.K.M.Shivakumar Dr.M.Kalpana Dr.C.S.Sumathi	Design and conductcourses in artificial intelligence, machine learning and Big Data Analytics			setting up of data analytics lab Develop networks with agro industries, commodity exchanges, consultancy firms for improved networking of academia with industries
Project 4: A Study on Performances of Regulated Market in Tamil Nadu				
Coimbatore Dr.S.Padma Rani Dr.K.Mani	Data Analysis and Reporting			Assessment of status and current needs Of regulated markets
Project 5: Analysis of price transmission along the value chain with special reference to Red chillies, Turmeric, black gram and coconut				
Trichy Dr.S.Selvam	Turmeric black gram and Coconut: Traders survey Report writing			Nature and Degree of price transmission alongthe commodity chain for the selectcrops

Project 6: A study on post-harvest management and prices of small onion in Tamil Nadu				
Trichy Dr.R.Parimalarangan	Tabulation Analysis of data Report submission	…	…	Identification of Post Harvest Management and marketing practicesof Small Onion
Project 7: An Economic Analysis of Production and Marketing of Miner Millets in Southern Districts of Tamil Nadu				
Madurai Dr.A. Sundar	Data collection Data entry Analysis of data. Report submission	-	-	Identification of marketing channel , constraints in production and marketing of minor millets
Project 8: Economic Analysis of Coriander Seed Marketing in Southern Tamil Nadu				
Madurai Dr.R.Rajesh,	Report submission	-	-	Identification of the coriander marketing channels and problems affecting the coriander seed marketing

Theme No:3	**Title**	**Natural Resources and Environmental Economics**		
Theme Leader	**Dr. D.Suresh Kumar**			
Name of the Scientists and Centre	2020-21	2021-22	2022-23	Deliverables/ expected output
Project 1: An Assessment of Agricultural Vulnerability to Climate Variability in Tiruchirappalli District of Tamil Nadu.				
Trichy Dr. R. SalvadiEaswaran	Analysis of data, Report Submission	-	-	Vulnerability index relating to the impact of climate variability

Project 2: Frontier Agricultural Technologies for Climate Change Adaptation and Mitigation: Policy Options for Innovations and Technology Diffusion				
Eachangkottai Dr.V.Saravanakumar Dr.R.Balasubramanian Dr.K.Boomiraj	Data collection Analysis of data Report submission			Socio-economic impact of frontier technologies in riceand sugarcane production Impact on resources conservation Determinants of farmer's preference in adoption
Project 3:Economic Impact of Climate Change on Hill Vegetable Farming in Tamil Nadu				
Periyakulam Dr.S.Varadha Raj	Analysis of data Report submission			Adaptation strategies of farmers to mitigate adverse climate change Prediction of weather based area, production, productivity and profitability of vegetables

Theme No:4	**Title**	**Impact Evaluation of Development Projects**		
Theme Leader	Dr.D.Suresh Kumar			
Name of the Scientists and Centre	2020-21	2021-22	2022 -23	Deliverables/ expected output
Project 1: Evaluation of Watershed Development Projects Implemented under IWMP, DPAP/ IWDP and NWDPRA in Tamil Nadu.				
Coimbatore Dr. D. Suresh Kumar Dr. K.R. Ashok Dr. S. Varadha Raj	Filed visits Collection of data Report preparation		-	Evaluation reportof watershed development programmes

Project 2: Impact Evaluation of NABARD - CSR Partnered Nammiyampattu - Kovilur Watershed Projects in Thiruvannamalai District of Tamil Nadu.				
Periyakulam Dr S. Varadha Raj Dr S. MuraliGopal	Report Submission	-	-	Evaluation report of Kovilurwatershedproject
Project 3: Economic Evaluation of Solar Powered Pumping Systems in Tamil Nadu				
Coimbatore: Dr.M.Anjugam Dr.Mahendiran	Analysis of data Report Submission	…	…	Economics of crops with solar pumpsetsvsother Pumpsets; Impact of Solar pumps vs other pumps Benefits and Constraints in use of solar pump sets

Theme No:5	**Title**	**Documentation of Intellectual Property Rights and Impact Studies (IPMC)**		
Theme Leader	**Dr.M.Anjugam**			
Name of the Scientists and Centre	2020-21	2021-22	2022-23	Deliverables/ expected output
Project 1 : Documentation of Select Agricultural Goods for GI Registration in Tamil Nadu				
Coimbatore Dr. N. Kiruthika	Analysis of data Report Submission	. .	. .	Facilitation of getting GI tag for RamnadMundu Chili

C.Details of research projects

A total of 33 projects being implemented in the department of Agricultural Economics (33 Nos.) and CARDS (5 Nos.) were reviewed. Out of which, five University sub-projects and four externally funded projects were completed. A total of 29 projects are ongoing in the department.

Depts.	Externally funded projects		Core projects		University sub projects		Total	
	Compltd.*	Ongoing	Compltd.*	Ongoing	Compltd.*	Ongoing	Compltd.*	Ongoing
I. Department of Agricultural Economics								
Coimbatore	2	6	..	3	4	2	6	11
Madurai	..	..	..	..	..	4	..	4
Trichy	..	..	..	3	..	2	..	5
Killikulam	..	..	..	..	..	1	..	1
Periyakulam	..	1	..	1	..	..	..	2
Echangottai	..	2	..	..	1	..	1	2
Mettupalayam	..	..	..	..	..	..	..	..
Vazhavachanur	1	..	..	..	..	..	1	..
Kudumiyanmalai	..	..	..	..	..	..	..	..
TOTAL	**3**	**9**	**..**	**7**	**5**	**9**	**8**	**25**

***Completed.**

D.Remarks of the ongoing projects

S. No	Project No.	Project Title	Project Period	Project Leader (PI/Co-PI)	Remarks
a.	**Externally Funded Projects**				
1	GOI/CARDS/CBE/AEC/1970/R001	Comprehensive Scheme for Studying the Cost of Cultivation of Principal Crops in Tamil Nadu	Continuous Scheme Since 1970	Dr.D.Suresh Kumar Dr.V.Karthick	The project may be continued. A study on benefits availed by sample

D.Remarks of the ongoing projects					
S. No	**Project No.**	**Project Title**	**Project Period**	**Project Leader (PI/Co-PI)**	**Remarks**
					beneficiaries of CCPC scheme by MSP on various crops may be taken up
2	GoTN/CARDS/ CBE/AEC/1983 / R002	Institution of endowment chair in agricultural marketing	Continuous Scheme Since 1983	Dr.D.Suresh Kumar	The project may be continued.
3	NASF/CARDS/ CBE/AEC/2019 /D001	Causes and Consequences of e-NAM on the Economic Development of Indian Agriculture	2019-22	Dr. K.M.Shivakumar DrM.Prahadeeswaran Dr. N.Kiruthika Dr.S.R.Padma	The project may be continued.
4	NAHEP/CBE/ ABD/2019/E00 1	Artificial Intelligence & Big Data Analytics in Food & Agriculture	2019-22	Dr. K.M.Shivakumar Dr. M.Kalpana Dr.C.S.Sumathi	The project may be continued.
5	GoTN/CARDS/ CBE/AEC/2020 / R020	A Study on Farm Level Productivity Assessment of MajorHorticultur al Crops In Tamil Nadu	1.03.2020 to 30.06.2020	Dr.K.R.Ashok Dr.D.Suresh Kumar Dr. A.Vidhyavathi	Completion report may be sent. The results may be published

D.Remarks of the ongoing projects					
S. No	**Project No.**	**Project Title**	**Project Period**	**Project Leader (PI/Co-PI)**	**Remarks**
6	NIAM/ECK/TNJ /ECO/2020/ R001	Poultry Business School - Income Enhancement through Critical Stages and Interventions during production and Post-Production	December 2019 to November 2020	Dr. S. Angles Dr. K.R. Jahanmohan Dr.V. Saravanakumar Dr.Satish Chandra Dr. C. Mehala	The project may be continued.
7	New Project	Frontier Agricultural Technologies for Climate Change Adaptation and Mitigation: Policy Options for Innovations and Technology Diffusion	2019-2021	Dr.V.Saravanakumar Dr.R.Balasubramanian Dr.K.Boomiraj	The project may be continued.
8	TAWDEVA/CA RDS/CBE/AEC/ 2017/E001	Evaluation of Watershed Development Projects Implemented under IWMP, DPAP / IWDP and NWDPRA in Tamil Nadu	2018 - 2019 & 2019 – 2020	Dr. S. MuraliGopal Dr. K.R. Ashok Dr. D. SureshKumar Dr. M. Chinnadurai Dr. S. Varadha Raj	Completion report may be sent. The results may be published

D.Remarks of the ongoing projects					
S. No	**Project No.**	**Project Title**	**Project Period**	**Project Leader (PI/Co-PI)**	**Remarks**
9	HIH/HCRI/PKM/DSS/2019/0007	Impact Evaluation of NABARD - CSR Partnered Nammiyampattu - Kovilur Watershed Projects in Thiruvannamalai District of Tamil Nadu	2019-20	Dr. S. Varadha Raj Dr. S. MuraliGopal	Completion report may be sent. The results may be published
b.	**Core Projects**				
1	CARDS/CBE/ AEC/2018/CP085	Economic Evaluation of Solar Powered Pumping Systems in Tamil Nadu	November 2018 to Sep 2020	Dr.M.Anjugam Dr.R.Mahendiran	The project is to be completed on 30.9.2020.
2	CARDS/CBE/ AEC/2018/CP086	A Study on Performance of Regulated Markets in Tamil Nadu	November 2018 to Sep 2020	Dr.S.Padma Rani	The project is to be completed on 30.9.2020.
3	CARDS/TRY/ AEC/2018/CP095	Analysis of price transmission along the value chain with special reference to Red chillies, Turmeric, Black gram and Coconut	1.5.2018 to 30.9.2020	Dr.S.Selvam	The project is to be completed on 30.9.2020.

D.Remarks of the ongoing projects					
S. No	**Project No.**	**Project Title**	**Project Period**	**Project Leader (PI/Co-PI)**	**Remarks**
4	CARDS/TRY/ AEC/2018/CP096	A Study on Post-Harvest Management and Prices of Small Onion in Tamil Nadu	Nov 2018 – Sep 2020	Dr.R.Parimalarangan	The project is to be completed on 30.9.2020.
5	CARDS/TRY/ AEC/2018/CP154	A Study of Collective Farming Scheme in Tamil Nadu	December 2018 to Sep 2020	Dr. S.D.Sivakumar Dr. S.Selvam Dr.M.Prahadeeswaran Dr.R.Ramasubramanian Dr. C. Muralidharan, Dr.S.Selvanayaki	Completion report may be sent. The results may be published
6	CARDS/PKM/ AEC/2018/CP162	Economic Impact of Climate Change on Hill Vegetable farming in Tamil Nadu	2018-2020	Dr. S. Varadha Raj	The project is to be completed on 30.9.2020.
7	CARDS/CBE/AEC/2018/CP087	Documentation of Select Agricultural Goods for GI Registration in Tamil Nadu	01.09.2018 to Sep 2020	Dr.N.Kiruthika	Dean Horticulture may be contacted for technical information on Mundu chilli. The project is to be completed on 30.9.2020.

c.	**University Research Projects**				
1	CARDS/CBE/ AEC/2018/004	Crop Diversification for Nutritional Security in Tamil Nadu	Sept 2017 to March 2021	Dr.K.R.Karunakaran	The project may be continued.
2	CARDS/CBE/ AEC/2017/001	An Economic Inquiry into Farmers' Knowledge, Perception and Intensity of Pesticide Use in Major Vegetable Cultivation of Tamil Nadu	April 2017 To September 2020	Dr.M.Thilagavathi	The project may be continued.
3	CARDS/TRY/ AEC/2018/001	An Assessment of Agricultural Vulnerability to Climate Variability in Tiruchirappalli District of Tamil Nadu	January 2018 to December 2020	Dr.R.SalvadiEaswaran	The project may be continued.
4	CARDS/MDU/ AEC/2018/ 001	Structural changes in Rural Employment and Its Implications for Agriculture	June 2018 to May 2020	Dr.A.DanielViswasam Samuel	Completion report may be sent. The results may be published
5	CARDS/MDU/ AEC/2018/ 003	Economics of Production and Planning under Risk in the Dry Farming Tracts of Virudhunagar District of Tamil Nadu	April 2018 to March 2020	Dr.D.DavidRajasekar	Completion report may be sent. The results may be published

6	CARDS/MDU/ AEC/ 2019/001	Doubling Farmers Income: An Empirical Analysis on Relationship between Crop Diversification and Farm Income	November, 2019 to March, 2021	Dr.A.Malaisamy	The project may be continued. The criteria on Doubling of Farmers Income by GOI may be incorporated in the study for making assessment
7	CARDS/TRY/ AEC/2019/001	Socio economic assessment of High Density Planting in Mango and Guava	Sept' 2019 to Aug'2021	Dr.S.Senthilnathan	The project may be continued. The implementation details of the High density planting may be obtained from the department officials for data collection
8	CARDS/MDU/ AEC/2018/004	An Economic Analysis of Production and Marketing of Miner Millets in Southern Districts of Tamil Nadu	2019-20	Dr. A. Sundar	The project may be continued.

9	CARDS/MDU/ AEC /2017/002	Economic analysis of Coriander Seed Marketing in Southern Tamil Nadu	June 2017 to May 2020	Dr.R.Rajesh	The project may be completed in time and completion report may be sent

III. AGRICULTURAL EXTENSION RURAL SOCIOLOGY

A. Key findings of Completed projects

a. Externally Funded Projects

A**FO (M)/DEE/CBE/TD/2019/T001**

Agriculture Field Officers Training Programme (Maldives)

Dr. M. Jawaharlal (PI),Dr. Ravi Kumar Theodore (CoPI),

Dr. R. Premavathi (CoPI)

Based on pre and post evaluation, it was found that there was a significant increase in knowledge levels of all the six trainees.

The feedback from Trainees revealed the following:

- All the trainees expressed satisfaction over the orderly manner in which the training was organized, so as to cover a wide range of subjects that will be applicable to Maldives conditions.
- Overall, they felt that the time allotted to theory, practical and field visits were appropriate. However, they felt that practical hours should have been little bit more.
- They stated that though the training schedule was quite intensive, they were fully involved in the training, and were able to gain new knowledge and skills. None of the six trainees missed even a single class during the six months.
- While appreciating the presentations made by the Scientists during the training classes and their competence, the trainees found the Scientists to be very interactive. However, Scientists' lack of knowledge about Maldives conditions was a slight handicap to them.
- Practical sessions were found to be particularly useful for them, as they were given hands-on-training on different technologies, which gave them better understanding of the theory.

- One Field Visit was arranged every week, which in their opinion enabled them to gain new insights due to the productive interactions that they had with farmers, extension functionaries of different departments and others.
- They felt that the interactions with the TNAU authorities' viz., Vice-Chancellor, Registrar, Deans and Directors were very valuable, giving them wider perspectives.
- All the trainees looked forward for successful training transfer of the technologies that they have learnt during the training, especially related to Horticulture, Integrated Farming System (IFS), Organic farming, Dairy farming, Poultry farming, Agro-forestry, Mushroom production, Seed production, Forage production, and Crop protection.
- They expressed satisfaction over the logistics namely, accommodation, food and transport arrangements.

Since the Maldives authorities are pleased with the manner in which the Phase I of the training was organized, they have requested TNAU to offer the training for a further period of four months as Phase II.

b.) UNIVERSITY RESEARCH PROJECTS

1. CARDS/CBE/AEX/2017/001

Study on Present Extension System in Tamil Nadu – A Critical analysis (Dr.N.Sriram, Dr.M.Asokhan and Dr.P.P.Murugan)

SWOC analysis among the extension functionaries were organized among Department of Agriculture, Department of Horticulture, Department of Agrl Marketing and Agri Business, Agricultural Engineering and Seed Certification in Salem, Namakkal, Sivaganga, Madurai and Coimbatore districts to find the training needs, officials constraints and their suggestion to overcome the problem in the department.

SWOC analysis also organized among the department of agricultural marketing and agri business of Trichy and Villupuram districts.

2. CARDS/CBE/AEX/2017 /001

Spread And Acceptance of TPS 5 Paddy Variety in Kanyakumari District (Dr.R.Premavathi and Dr.R.Sasikala)

Most of the respondents belonged to old age (60%) and illiterate category (40%). followed by agriculture as a primary occupation (60%).

Majority of the farmers (63.33 %) had by more than 5 acres of rice cultivation area followed by 2.5 acres – 5.00 acres (23.33 %).

Most of the respondents (58.33 %) had high level of extension participation followed by medium level (28.33 %).

Adoption of TNAU released rice variety of TPS 5 and management technologies

Seventy-five per cent of the respondents adopted TPS 5 variety followed by ASD -16 (25.003 %) in Kannipoo season.

More than eighty per cent of the respondents adopted recommended seed rate, age of seedling and spacing due to interventions of KVK.

Meager percents of the respondents adopted (26.66 %) recommended basal and NPK fertilizer application, weed management practice and application of foliar spray.

More than fifty per cent of the respondents adopted recommended pest control measure for leaf folder and stem borer.

Cent per cent (100.00 %) of the respondents adopted timely harvest. Eighty per cent of them adopted paddy harvester for harvesting.

Marketing Behavior

- Gunny bags were used for package material (100%)
- Tempo van used for transport of rice (73%) followed by tractor (26.66%).
- Sold their produce in nearby towns (73.33 %) followed by village itself (20.00%).
- Sold their produce through wholesale merchant (53.33 %) followed by commission agents (26.66%).
- Higher price and immediate payment (73.33 %) as the main criteria for the selection of market

Constraints and suggestions

- Non availability of machineries in time like Transplanter, tray and paddy harvester reported by (90%)
- More than eighty per cent of the respondents reported that high weed infestation and improper usage of Pre-emergence herbicide, lack of knowledge on application of recommended fertilizer and labour scarcity were the constraints.
- Non availability of quality of seed in time (71%)
- Lack of knowledge on pest management practices especially stem borer and leaf folder (68%)

Suggestions offered

- Training cum demonstration to be given to the farmers on technologies viz., application of soil test based recommended fertilizer

- Creating awareness cum training for usage of pre emergence herbicide application
- Arrangement to supply the quality seed for the farmers in time by officials, Seed Production Department and KVK

3. CARDS/MDU/HSC/AEX/2018/002 Assessing the Technological Gap in the cultivation of Major Vegetable Crops in Madurai District. (Dr.A.JanakiRani)

- Majority of the respondents in the study area are using hybrids. The research station yield for hybrid tomato is 38.4 t/ac. The average farmers yield is 32 t/ac.
- The yield gap prevails for the tomato hybrid is 6.4 t/ac. The technology index of tomato is 6.25. The extension gap is 4t/ac.
- With regard to brinjal the research station yield is 32 t/ac and average farmers yield is 22.5 t/ac. Hence the average yield gap I is 9.5 t/ac.
- In the case of Bhendi, the yield gap I come around 3t/ac. The technology index is more in case of brinjal and bhendi (21.87 and 24.0)
- Fruit borer (70.00 %), blossom dropping and less fruit setting percentage (68.33%), Sunscald (61.66 %), tomato cracking or split tomato problem (53.33%), yellow or green tomato shoulders and deformation of tomato fruit (51.66%) were the problems expressed by the farmers.
- Yellow or green tomato shoulders (46.66%), blossom end rot (33.33%), hardness of fruit/ smaller size of fruit bearing (30.00%) and tomato fruit zippering (26.66%) were the other problems which leads to yield gap in tomato
- Major technological gaps are due to lack of knowledge to utilize High yielding varieties available, Soil testing and SHC recommendations, application of foliar spray / micronutrient spray/ growth regulators (100.00%) followed by non adoption of IPM Packages (77.77%).

Improved nutrient-use efficiency, use of organic manures, bio fertilizers, bio-agents, mulching with crop residues, IPM practices, knowledge on pesticide usage, vegetable value addition, education on climate change are the approaches needed for the sustainable production.

4. CARDS/MDU/AEX/2017/003 Impact of Farmer to Farmer Extension Approach under ATMA – An Analysis (G. Selvarani)

Perception of the farmers on the roles of Farmer Friends in TOT

Majority of the farmers perceived that Farmers Friends serve as a vital Link between the Extension officials and farmers (91.00 per cent), involved in mobilization of the farmers (89.00 per cent), diffuse the technology very quickly among the farmers (87.00 per cent) and adopts the technology first in their farm (85.00 per cent).

Impact created by farmer Friends

Technological impact

Due to the activities of Farmer Friends there is increase in adoption of specific technologies. (83.00 per cent)

Social Impact

Increased contact with Extension officials (91.00 per cent) and Increased training participation (85.00 per cent) were the social impacts created by Farmer Friends.

Economic Impact

Increase in farm income due to adoption of new technologies (70.00 per cent) was the economic impact.

Psychological impact

There was increased trustworthiness (94.00 per cent) among the farmers.

SWOC analysis

Strengths

Direct contact with the farmers

- Serves as a motivational force for other farmers
- Increased Trustworthiness
- Social Proximity of Extension service providers
- More information flow

Weakness

- Retain the information with themselves
- Shares information only to their relatives and known farmers
- Some farmer friends are inactive
- No interim evaluation on the performance

Opportunities

- Scope for appointing one farmer friend per village
- Developing evaluation criteria for assessing performance of Farmer Friends

Challenges

- Appointing unemployed youth as Farmer Friend.

Strategies to increase the effectiveness of Farmer Friend approach under ATMA

- Appointing more number of Farmer Friends
- Special skill based trainings may be provided for Farmer Friends
- Training on ICT to Farmer Friends
- Periodical evaluation of the performance of Farmer Friends

Recommendations

- One farmer friend per village may be allotted
- Unemployed youth may be appointed as Farmer Friend

Based on the performance evaluation, new Farmer Friend may be positioned.

5. CARDS/MDU/HSC/AEX/2018/003

Analyzing the sustainable livelihood security and Marketing behaviour of Jasmine Vendors of Madurai district.

Dr L. Nirmala

- Most of the respondents (43 %) were middle aged jasmine vendors of 36 – 45 years old.
- A vast majority of 88% of the respondent are with nuclear family.
- About 67 % of the family of jasmine farms the livelihood and bread winning performances as it was found that there is a single earning member in the family.
- The average per day income from jasmine selling is Rs. 350 – 500.
- The package material used for jasmine is banana leaf is reported by 59 % of the respondents.
- The independent variable media exposure has shown that 69 % of the respondents possessed the medium level of media exposure.
- A Majority of 47 % of the jasmine vendors are using share autos for their transport to buy the flowers and to reach their selling place.
- An overwhelming majority of 60% of the respondents are selling jasmine by sitting in a temporary shop like structure.
- Most of the respondents are travelling 5-10 kms daily to reach the flower market of Madurai.

- The place of selling data has shown in the market place (28%), around the temple zone (29%), Bus stand zones (12%), and residential areas (19%) and along the read sides and parts.
- The Correlation analysis between the independent variables (x_1 to x_8) and the dependant variables entrepreneurial behavior has shown that Earning members of the family and the per day income earned through jasmine marketing are highly responsible for entrepreneurial behavior.

These two variables showed a significant association with the entrepreneurial behavior

6. CARDS/KDM/AEX/2016/001

Documentation of Existing Indigenous and Traditional Knowledge of Farmers by Using New Media Tools in Pudukkottai District of Tamil Nadu N. (Anandaraja),

- Provide an in-depth knowledge about the prevailing traditional knowledge.
- A good research base for new technology innovation, generation, renovation, development and management.
- It would be copy righted on behalf of farmers by TNAU.
- Persevering the traditional knowledge for our future generation.
- Scope for development of PTD and Ethno Farming Centre

c). CORE PROJECTS

1. **CARDS/ MTP /AEX 2018/CP 167**

Identification and documentation of ITKs among the tribes of The Nilgiris.

(Dr.C.CinthiaFernandaz)

- The maximum number (4) of ITKs on Agriculture were indentified and documented
- Among the identified ITKs the traditional weedicide was adopted by nearly 85 per cent of the respondents
- The weedicide was prepared with the available weeds available in the field and sprayed to the main crop. The actual plants used and the AI to be explored for scientific validity.
- Perception of the Tribals on Conservation of ITKs was measured in terms of Conservation of seeds of traditional crops, Cultivation of traditional crops Livelihood sustainability through *ITK* conservation, Improvement in standard of living and Government policies

- Educational status, farming experience, decision making behavior and Progressiveness were the factors influencing the attitude of the tribals on documentation and conservation of ITKs.

Policy implication

- Location specific environmental education modules to be identifies for creating awareness on the importance of ITK and its conservation

Involvement of farmer's organization, KVK, Zonal Research Stations and SAUs in different strata are important for proper documentation, validation and development of environment friendly, location specific technology and commercialization of ITK

2. CARDS/CBE/EXT/ORG/CP149 Assessment of the Cost and Returns and Marketing of Organic Vegetables in Tamil Nadu (Dr. R.Jansirani)

Profile of the respondents

- Above half (56.67 %) of the respondents were in old aged followed by 27.78 per cent in middle aged and the remaining 15.56 per cent were in young age.
- Majority (66.67%) of the organic vegetable farmers had agriculture as their primary occupation while 33.33 per cent had agriculture as their subsidiary occupation.
- 70 per cent of the organic vegetable farmers were educated at secondary level and main occupation was organic agriculture.
- A large proportion of the respondents were medium farmers (49.44%), followed by small (25.56 %) farmers, big (15 %) farmers and marginal (9.44 %) farmers in the study area.
- Nearly fifty per cent (48.89%) of the organic vegetable farmers possessed considerably high number of livestock in their household, followed by medium (26.67 %) and low level (24.44%).
- More than fifty per cent (60.00) of the respondents had high level of experience in organic farming followed by medium (26.11 %) and low (13.89 %) level of farming experience in organic vegetables cultivation. It could be inferred from the finding that majority (86.11 %) of the respondents had high to medium level of experience in organic vegetable cultivation.
- More than 58.33 per cent of the organic vegetable farmers had attended more than one training followed by 36.67 per cent who had attended one training whereas the remaining (5 %) did not attend any training.
- Majority (69.44 %) of the organic vegetable farmers had medium level of decision making behaviour followed by high (18.33 %) and low (12.22 %)

level. It could be inferred from the findings that majority 69.44 %) of the organic vegetable farmers had medium level of decision making behaviour.

- Majority (77.22 %) of the organic vegetable farmers were capable in marketing of their produces followed by less capable (22.78 %).

Cost and returns of cultivation of the organic vegetables

Majority (90%) of the organic vegetable farmers cultivated bhendi followed by tomato (80%) brinjal (70%) and gourds (60%) respectively. In the demand and supply chain management system among the vegetables, bhendi is fetching good price in the market place and also one of the best medicinal vegetables. it does not require staking, the tomato is indeterminate habit need to be pruned and staking which fed high cost in cultivation and management sides. Fruits may be discoloured /uneven sizes may affect the sale of the tomato in the market yards.

Regarding cost and returns, among the vegetables, more remunerative vegetable was brinjal (1:2.95) followed by bhendi (1:2.88), gourd (1:2.55) and tomato (1:2.52).

Preference of marketing channel, marketing price spread and efficiency

Majority of (61.47 Garrett score) of the organic vegetable farmers preferred to market their produce through Channel 1 because the vegetables are highly perishable nature reaching the consumer through multi channel supply chain by producer, commission agent ,wholesaler, retailer and consumer .

In the organic farming middle men representing the primary purchasing out let for organic vegetables in the study areas followed by Channel 2 (59.38 Garrett score) which includes producer, whole seller, retailer and consumer. Similarly, Rank III was given to the Channel 3 which included producer, retailer and consumer and had Garrett score of about 51.71 reasons that some of the farmers avoid middle man involvement would be helpful for the farmers to obtain higher price for their organic products. Rank IV was given to the Channel 4 (33.67 Garrett score) which included producer to consumer.

Marketing price spread and efficiency

- At village level commission mandi/agent usually buy the vegetables and trade commission mandies undertake the functions of major assembly and forwarding to consuming centres for fixed commission charged that ranges from 6 to 15 per cent of the value of transactions.
- Wholesalers procuring from the mandies arrive from different consuming centres and bid in the auctions conducted at these mandies. Often farmers voice concerns about unbiasedness of the commission agents and do not rule out the possibility of collusion between them. Wholesalers distribute the produce to the final consumers through local retailers.

- Thus, Producer -Commission Agent-Wholesaler -Retailer -Consumer is the predominant channel through which major share of the vegetables produced are observed to be marketed.
- Specifically, this holds true for those vegetables that reach the consumer without changes in its form. In this channel traders and commission mandies undertake the assembling function, the wholesalers the twin functions of translocation and distribution and the retailers the final distribution function.
- Observations indicate that the risks of wastages and losses travel in the inverse direction starting from the retailers, to wholesalers and minimally to the commission agents. However, the absolute price risks are born by the producers and consumers at both ends of the channel.
- Vast majority (80 %) of the organic vegetable farmers were dependent upon retailers and less than one third of the organic vegetable farmers (20 %) in the PKVY started own market out lets for marketing of their organic products, including vegetables, fruits, grains medicinal based value added products, natural sops and organic virgin oils and other cosmetics products .

Existing market outlets and Organic vegetable products pricing

- Cent per cent of the organic vegetable farmers expects to earn 1 to 2 per cent premium for the organic vegetables. At present, most of the farmers are getting premium in this range. Still, forward market linkage of organic produces, especially perishable produces, is still a major issue as per farmers. On the other hand, most of the sample consumers are of the opinion that the consumption of the organic produces will increase drastically if the premium charged for organic will be in the range of 20-30 per cent. Large portion of the population is willing to pay premium in this range.
- The premium paid on the organic produces by the consumers, prices of selected commodities were collected from the sample outlets. Average price of these commodities has been compared with average price non-organic produces. It is found that the consumers are paying premium in the range of 27 per cent to 95 per cent. Majority of the outlets charge premium above 75 per cent in the commodities like honey, ghee, cooking oil and jaggary
- Most of the retail outlets are aiming to bring down the premium for organic produces to around 30-40 per cent. However, higher premium charged by middlemen, lack of sustained supply chain, high losses in perishable commodities, high inventory in non-perishable commodities, etc., are the major aspects, which escalates the operational cost of the retail outlets. Strengthening of backward linkages will bring down the premium mark up of the organic produces.

- The predominant channel 1 through which major share of the vegetables to be marketed the commission range from 6-15 percentage. Absolute price risks are born by the producers and consumers.

Constraints in the cultivation of organic vegetables

Production Constraints

The major constraints expressed by the organic vegetable farmers in adoption of organic farming practices were bulk quantity of organic inputs requirements, inadequate organic inputs in time, lack of research support in providing scientific rationality of practices, non-availability of labour, insufficient of water for irrigation and drastic reduction in cattle population.

Marketing Constraints

Lack of premium price for organic vegetables, high investment in the initial stage of organic farming, inadequate market facilities for sale of organic vegetables and lack of government supports for organic produces, higher premium charged by middlemen and lengthy organic certification procedure and high cost.

Policy implications

Research Intervention.

- Conserve traditional vegetable varieties seeds
- Take up research on organic vegetables farming for its promotion
- Quality control of organic inputs

Extension Intervention

- Create the awareness about the importance of organic vegetables and its value addition among the public
- Provide training and method demonstration on production of organic inputs for organic vegetable production
- Develop a model village of organic vegetable farming as whole village concept.

Production Intervention

- Provide production subsidy for organic vegetables seeds production and procure the same and sell to other organic vegetable farmers with subsidised rate.
- Provide subsidy for purchase for purchase of livestock or give to organic vegetable farmers at free of cost
- Simplifying certification procedures, reduced cost of certification and encouraging group certification
- Formulate and implement organic farming policy

Processing Intervention

- Develop organic vegetable processing centres at block level in the study areas
- Provide hands-on training on processing and value addition in organic vegetables
- Supply of organic vegetable processing machineries at subsidised rate.

B. Action Plan (2020-2023)				
Theme No. 1	**Monitoring of Adoption and Impact**			
Title	a.) CARDS/MDU/AEX/ 2019/001 Awareness, Knowledge and adoption of Sugarcane Technologies Popularization through AICRP scheme			
Theme Leader	Dr. R. Velusamy			
Name of the Scientists and Centre	Dr. R. Velusamy Dr. J. Prabhakaran AC&RI, Madurai.			
Year	**2020-21**	**2021-22**	**2022-23**	**Deliverables/Expected Output**
	Collection of data, data entry and analysis, interpretation of data and report preparation.	-	-	• Spread and adoption of Sugarcane technologies by AICRIP and non AICRIP sugarcane farmers will be known. • Constraints in adoption of Sugarcane technologies in both AICRIP and Non AICRIP sugarcane farmers will be identified.
Title	b.) CARDS/TRY/AEX/2019/001 A study on the impact of vegetable farming on the livelihood status of small farmers in Trichy district			
Theme Leader	Dr.P.Sumathi			

Name of the Scientists and Centre	Dr.P.Sumathi HC&RI for Women, Trichy

Year	**2020-21**	**2021-22**	**2022-23**	**Deliverables/Expected Output**
	Collection of data, data entry and analysis.	Interpretation of data and report preparation.		• Adoption behavior of small farmers towards the recommended cultivation technologies in vegetable crops will be known. • Socio and economic impact of small farmers due to vegetable farming will be assessed • Constraints faced by the farmers in vegetable cultivation will be explored.
Title	c.) CARDS/TRY/AEX/2019/002 A study on knowledge, adoption and constraints of Jasmine growers in Tiruchirappalli district			
Theme Leader	Dr. P. Jaisridhar			
Name of the Scientists and Centre	Dr. P. Jaisridhar HC&RI for Women, Trichy.			
Year	**2020-21**	**2021-22**	**2022-23**	**Deliverables/Expected Output**

	Collection of data, data entry and analysis.	Interpretation of data and report preparation.		• Knowledge and extent of adoption of jasmine growers will be explored. • Marketing constraints will be identified.
Title	d.) CARDS /MDU/AEX/2019/003 Impact Analysis of TN-IAMP in PeriyarVaigai Command Area of Madurai District			
Theme Leader	Dr.K.Ramakrishnan			
Name of the Scientists and Centre	Dr.K.Ramakrishnan AC&RI, Madurai.			
Year	**2020-21**	**2021-22**	**2022-23**	**Deliverables/Expected Output**
	Data collection and analysis and report preparation	-	-	• Problems in adoption of GM SRI cultivation techniques will be known.
Title	e.) CARDS/MDU/AEX/2019/002 Prospects and problems of TNAU rice production technologies in Madurai District.			
Theme Leader	Dr.JaneSujatha			
Name of the Scientists and Centre	Dr.JaneSujatha CSC&RI, Madurai			

Year	2020-21	2021-22	2022-23	Deliverables/Expected Output
	Data collection and analysis and report preparation	-	-	• TNAU rice production technologies disseminated among the farmers of Madurai District will be documented. • Extent of adoption of technologies by farmers will be identified. • Problems faced by rice farmers in adoption of technologies will be explored and suitable strategies will be formulated to overcome problems.
Title	f.) CARDS/ KVK/ PPT/ AEX/ PUL/ 2019/001 Impact of KVK Interventions on TNAU Released Varieties and Management Technologies of Pulses in Dharmapuri district			
Theme Leader	Dr.M.A.Vennila			
Name of the Scientists and Centre	Dr.M.A.Vennila KVK, Dharmapuri			
Year	**2020-21**	**2021-22**	**2022-23**	**Deliverables/Expected Output**

	Data collection and report submission	-	-	• Adoption of pulse varieties and management technologies of pulse growers will be known. • Impact of interventions of KVK, Dharmapuri on Pulse varieties and Management technologies will be assessed. • Constraints faced by pulse growers will be identified and suitable strategies will be formulated.
Theme 2	**Extension Research on ICT in Agriculture**			
Title	a.) CARDS/ TRY/ AEX/2020/001 Attitude of Farmers towards Kisan Call Centre in Tiruchirappalli District			
Theme Leader	Dr.D.PeriyarRamasamy			
Name of the Scientists and Centre	Dr.D.PeriyarRamasamy ADAC&RI, Trichy.			
Year	**2020-21**	**2021-22**	**2022-23**	**Deliverables/ Expected Output**
	Collection of data, data entry and analysis.	Intrepretation of data and report preparation.	**-**	• Attitude of farmers towards KCC will be known. • Impact of KCC will be assessed. • Constraints faced by farmers will be explored.
Title	b.) No.DR/P2/ASO/TN-IAMP/WTC/2020 (F36NT) M-Velanmai			
Theme Leader	Dr.C.Karthikeyan			

Name of the Scientists and Centre	Dr.C.Karthikeyan AC&RI, Killikulam			
Year	**2020-21**	**2021-22**	**2022-23**	**Deliverables/ Expected Output**
	Developing the automated extension advisory system for farmers based on Artificial Intelligence	Pilot testing and validation of the created automated extension advisory system for farmers based on Artificial Intelligence	Up scaling the validated automated extension advisory system for farmers based on Artificial Intelligence in Tamil Nadu	• Automated extension advisory system for farmers based on Artificial Intelligence will be created and will be up scaled in Tamil Nadu.

Theme 3	**Assessment of Human Resource Potential for Agrl. Development**
Title	a.) CARDS/CBE/AEX/2020/001 MGNREGA Implementation in Tamil Nadu: Problems, Prospects and Remedial Strategies
Theme Leader	Dr.P.Balasubramaniam
Name of the Scientists and Centre	Dr.P.Balasubramaniam and Dr.N.Sriram TNAU, Coimbatore

Year	2020-21	2021-22	2022-23	Deliverables/ Expected Output
	Data collection and analysis	Interpretation of results and report preparation		• Extent of participation and socio-economic impact of beneficiaries in MGNREGA will be known. • Possibilities of involvement in the agricultural operations of the private land holdings will be explored. • Implementation issues and constraints faced by implementing agency and beneficiaries in MGNERGA and suggestions will be identified.
Title	b.) CARDS/KUM/AEX/2019/001 Sensitization Training on Recently developed Technologies and Modern Machineries in Agriculture			
Theme Leader	Dr.A.Sakunthalai			
Name of the Scientists and Centre	Dr.A.Sakunthalai AEC&RI, Kumulur			

Year	2020-21	2021-22	2022-23	Deliverables/ Expected Output
	Data collection and analysis	Interpretation of results and report preparation	-	• Knowledge level (pre and post exposure) of the 150 farmers will be assessed. • Attitude of trainees towards the mechanization will be known. • A total of 15 hands on training on various Agricultural technologies and mechanization will be imparted to 150 trainees. • Social, economic and technical constraints in the adoption of technologies will be explored and strategies will be formulated.
Theme 4	**Gender Studies and Livelihood of Tribal Farm Women**			
Title	a.) CARDS/MDU/HSC/AEX/2018/003 Knowledge and adoption of Modern Technology in Vegetable production			
Theme Leader	Dr L. Nirmala			
Name of the Scientists and Centre	Dr L. Nirmala CSC&RI, Madurai			

Year	2020-21	2021-22	2022-23	Deliverables/Expected Output
	Collection of data, data entry and analysis.	Interpretation of data and report preparation.	-	• The awareness and adoption level of plant health practices would be found. • This will be helpful in promoting more number of organic farming and to produce chemical free vegetables.
Title	b.) Enhancing the livelihood status of tribal women through community / village based bio-enterprises – Kodaikanal, Dindigul District			
Theme Leader	Dr.P.Balasubramaniam			
Name of the Scientists and Centre	Dr.P.Balasubramaniam, Dr. C.Gopalkrishnan TNAU, Coimbatore			
Year	**2020-21**	**2021-22**	**2022-23**	**Deliverables/Expected Output**
	Training on bio-fungicides production	Establishment of model bio – fungicide units Impact assessment Report submission	**-**	• Six trainings on bio-fungicides production technologies will be offered. • A total of 120 tribal women will be motivated to start community village based bio-enterprises for self- employment.
Theme 5	**Attracting and Retaining Rural Youth in Agriculture**			
Title	a.) DST/CARDS/MDU/EXT/2017/R006 Empowerment of SC/ST Rural Youth through Skill Development and Entrepreneurship Programmes			
Theme Leader	Dr. P. P. Murugan			

Name of the Scientists and Centre	Dr. P. P. Murugan TNAU, Coimbatore			
Year	**2020-21**	**2021-22**	**2022-23**	**Deliverables/Expected Output**
	Data analysis, interpretation of results and report preparation.	**-**	-	• Entrepreneurial need of SC/ST rural youth will be identified. • Training in the Selected entrepreneurial ventures will be provided. • Impact of interventions will be known.
Title	b.) CARDS/CBE/AEX/2019/002 Identification of Avenues to Retain Youth in Rural Areas			
Theme Leader	Dr.S.Kalaivani			
Name of the Scientists and Centre	Dr.S.Kalaivani TNAU, Coimbatore			
Year	**2020-21**	**2021-22**	**2022-23**	**Deliverables/Expected Output**
	Data collection and analysis and report preparation	-	-	• Present situation of youth in rural areas will be known. • Factors responsible for the movement of youth from agriculture will be identified. • Empowerment needs of youth in rural areas will be documented. Avenues for retention of youth in rural areas will be discovered.

Current status of the projects

A total of twenty four projects being implemented in the Department of Agricultural Extension and Rural Sociology were reviewed. Out of which, one externally funded project six University Research projects and two Core projects were completed; eleven university sub-projects and four externally funded projects are ongoing in the department.

C.DETAILS OF RESARCH PROJECTS

Campus	University sub projects		Core projects		Externally funded projects		Total
	Completed	Ongoing	Completed	Ongoing	Completed	Ongoing	
Coimbatore	2	2	1	0	1	3	9
Madurai	3	4	0	0	0	0	7
Killikulam	0	0	0	0	0	1	1
Trichy	0	3	0	0	0	0	3
Kudumiyanmalai	1	0	0	0	0	0	1
Echangottai	0	1	0	0	0	0	1
Mettupalayam	0	0	1	0	0	0	1
KVK, Dharumapuri	0	1	0	0	0	0	1
TOTAL	6	11	2	0	1	4	24

D. Remarks on ongoing research projects				
No	**Project Number and Title**	**Project Period**	**Project Leaders (PI/Co-PI)**	**Remarks**
	a. Externally Funded Projects			
1	AFO(M)/DEE/CBE/TD/2019/T001. Agriculture Field Officers Training Programme (Maldives)	July 29, 2019 to Jan. 27, 2020	Dr. M. Jawaharlal Dr. Ravi Kumar Theodore Dr. R. Premavathi	Completion Report may be prepared and submitted
2	DST/CARDS/MDU/EXT/2017/R006 Empowerment of SC/ST Rural Youth through Skill Development and Entrepreneurship Programmes	20.02.2017 to 19.02.2021	Dr. P. P. Murugan	Project may be continued
3	No.DR/P2/ASO/TNIAMP/WTC/2020 (F36NT) M-Velanmai	2019-23	Dr.C.Karthikeyan	The Computer Scientists of TNAU may be consulted for developing artificial intelligence.
4	Enhancing the livelihood status of tribal women through community / village based bio-enterprises – Kodaikanal, Dindigul District"	April-2020-22	Dr.P.Balasubra - maniam	Project may be continued
	b. **Core Projects**			
1	CARDS/ MTP /AEX /2018/CP 167 Identification and documentation of ITKs among the tribes of The Nilgiris	November 2018 to March 2020	Dr.C.Cinthia Fernandaz	Completion Report may be prepared and submitted. The weedicide was prepared with the available plants in the field may be explored for scientific validity.

2	CARDS/CBE/EXT/ORG/ CP149 Assessment of the Cost and Returns and Marketing of Organic Vegetables in TamilNadu	Jan-2019 to Dec.2020	Dr.R.JansiRani	Completion Report may be prepared and submitted. Project findings may be sent for policy recommendations.
c. **University Research Projects**				
1	CARDS/CBE/AEX/2017/001 Study on Present Extension System in Tamil Nadu – A Critical analysis	June 2017 to May 2020	Dr.N.Sriram Dr.M.Asokhan Dr.P.P.Murugan	Completion Report may be prepared and submitted. Project findings may be sent for policy recommendations.
2	CARDS/MDU/HSC/AEX/2018/002 Assessing the Technological Gap in the cultivation of Major Vegetable Crops in Madurai District.	May 2018 to Oct 2019	Dr.A.Janaki Rani	Completion Report may be prepared and submitted. The completion report may be reviewed separately since the results are contradictory.
3	CARDS/MDU/AEX/2017/003 Impact of Farmer to Farmer Extension Approach under ATMA – An Analysis	July 2017 to May 2019	Dr. G. Selvarani	Completion Report may be prepared and submitted. Project findings may be sent for policy recommendations.
4	CARDS/MDU/HSC/AEX/2018/003 Analyzing the sustainable livelihood security and Marketing behaviour of Jasmine Vendors of Madurai district	May 2018 to April 2019	Dr. L. Nirmala	Completion Report may be prepared and submitted.
5	CARDS/KDM/AEX/2016/001 Documentation of Existing Indigenous and Traditional Knowledge of Farmers by Using New Media Tools in Pudukkottai District of Tamil Nadu	November 2017 to May 2020	Dr. N. Anandaraja	Completion Report may be prepared and submitted.

6	CARDS/CBE/AEX/2020/001 MGNREGA Implementation in TamilNadu: Problems, Prospects and Remedial Strategies	March 2020 - Feb.2021	Dr.P.Balasubra - maniam and Dr.N.Sriram	Project may be continued
7	CARDS/CBE/AEX/2019/002 Identification of Avenues to Retain Youth in Rural Areas	Oct 2019 - Sept 2020	Dr.S.Kalaivani	Project may be continued
8	CARDS/MDU/ AEX/ 2019 /001 Awareness, Knowledge and adoption of Sugarcane Technologies Popularization through AICRP scheme	Oct 2019 - Sept 2020	Dr.R.Velusamy	Project may be continued
9	CARDS/MDU/AEX/2019/002 Prospects and problems of TNAU rice production technologies in Madurai District.	Aug 2019 to Aug 2020	Dr.JaneSujatha	Project may be continued
10	CARDS /MDU/AEX/2019/003 Impact Analysis of TN-IAMP in PeriyarVaigai Command Area of Madurai District	Dec 2019 to Nov 2020	Dr.K.Ramakrishnan	Project may be continued
11	CARDS/MDU/HSC/AEX/2018/003 Knowledge and adoption of Modern Technology in Vegetable production	Jan 2020 to Dec 2022	Dr.L.Nirmala	Project may be continued
12	CARDS/TRY/AEX/2019/001 A study on the impact of vegetable farming on the livelihood status of small farmers in Trichy district	Sept,2019 to August, 2021	Dr.P.Sumathi	Project may be continued
13	CARDS/TRY/AEX/2019/002 A study on knowledge, adoption and marketing constraints of Jasmine growers	Aug 2019 to July 2021	Dr. P. Jaisridhar	Project may be continued
14	CARDS/ TRY/ AEX/2020/001 Comprehensive analysis of Kisan Call Centre in Trichirappalli District /2020/001	Jan 2020 to Dec 2021	Dr.D.Periyar Ramasamy	Project may be continued
15	CARDS/KUM/AEX/2019/001 Sensitization Training on Recently	Sept 2019 to	Dr.A.Sakunthalai	Project may be continued

	developed Technologies and Modern Machineries in Agriculture.	Sept 2021		
16	CARDS/EKT/AEX/2018/001 A Study on Occupational Stress and Organizational Effectiveness of Women Employees in TNAU	May 2018 to Apr 2020	Dr. J. Thilagam	Project may be closed.

17	CARDS/ KVK/ PPT/ AEX/ PUL/ 2019/001 Impact of KVK Interventions on TNAU Released Varieties and Management Technologies of Pulses in Dharmapuri district	Dec 2019 to Nov 2021	Dr.M.A.Vennila	Project may be continued

IV. AGRICULTURAL AND RURAL MANAGEMENT
A. Key Findings of the completed Projects
Externally funded Projects

ICAR/CARDS/TRY/SOS/2016/R007

Developing Agribusiness Models Linking Farmers Groups and FPOs to Markets through Value Chain Management

(Dr.S.D.Sivakumar, Dr.K.Mahendran and Dr.T.N.Balamohan)

- Small and marginal farmers were higher in proportion with the SFAC supported and self-promoted FPCs. On the other hand, the number of medium farmers participation was higher in the self-promoted FPCs.
- Most of the farmer respondents felt that campaigns conducted by the producer organizations were one of the major sources of information
- Campaign by FPCs and network of social relationships encouraged the farmers to establish a membership in the formal group.
- Value addition, marketability through FPCs, quality input supply at a lower price and credit facilitation role of the FPCs significantly influenced the income improvement of the member farmers after joining the FPC. Credit facilitation and input supply were the most influencing factors.
- Majority of the FPCs were involved in procuring commodities from farmers and then marketed through the forward linkages established by the FPCs followed by the FPC's that provided advisory and technical services, whereas

only half of the sample of FPC's were involved in value addition and processing of produce purchased from the farmers.

- About fifty per cent of FPC's were involved in supplying inputs, while warehousing facilities was provided by 22of the FPCs.
- Backward and forward linkages are crucial for success of any business. In the FPCs, the backward linkage is described as creating links with farmers, input agencies, production advisories, facilitation of credit etc. On the other hand forward linkage is described as integrating market through establishing links with wholesalers, processors, retailers and exporters etc.
- FPCs provided the inputs for member farmers at a price lower than the market price. The benefit farmers obtained was the reduction in cost by buying inputs from the FPCs, reducing the role and cot associated with middle men and transportation.
- Majority of the sample FPCs facilitated loans through banks to the farmer members followed by facilitation of pledge credit and only 15.00 per cent of the FPCs provided direct input credit.
- Credit was provided by FPCs to farmers if the farmer carried out value addition activities and agreed to sell in the company brand name. Input credit in the form of loan at 12 per cent interest was given to the farmers.
- The market linkages was established by some of the FPCs for selling the produce with agribusiness firms like Marico, Sunlak, Rudhram export agency, NFPCL, Suguna industries, Nestle, Aavin, Supermarkets and exporters.
- The other channels of marketing of the FPC products are local markets, traders and government agencies. Majority of the FPCs marketed their produce to local market and traders without any agreement followed by the FPCs that had a direct tie- up with private agribusiness companies.
- The most critical factors influencing performance of FPCs were found to be quality, market information, credit linkage and market linkage.
- Very Poor to Fair Performing FPCs: Planned production, better market price were the driving forces and cost, lack of knowledge were the restraining forces for accessing the market related information.
- Poor to Fair Performing FPCs: Credit availability at right time and enhanced income were the driving forces. Loan procedures and risk in repayment were the restraining forces.
- Good and very good performing FPCs: Quality, labelling, product differentiation and brand image were the driving forces. Lack of knowledge on branding by the farmer members and branding cost were the restraining forces.
- 'Marketing the produce' was the biggest constraint, followed by not able to raise funds from farmers', cumbersome process of registration, no waiving of license fee and problem with obtaining loan from bank.
- FPCs may be awarded the status of Startups by the Government of India and extend all the provisions applicable.
- The FPCs may be given guidance for establishing a brand through Resource Institutions and provided space near the National highways for establishment of retail centres on long term lease.

- The FPCs may be provided priority in government procurement for PDS, noon meal scheme and other such initiatives
- The FPC members should be extended continuous training on production, value addition, marketing, accounting and other general management activities
- The government should institute an umbrella organization at the state level federating all the FPCs in the state.
- Survey of 200 FPOs conducted
- Identified factors responsible for performing and non-performing FPOs
- Analyzed the influence of social capital in performance of FPOs
- Financial analysis of FPOs based on Balance Sheet data
- Survey on Consumer Perception and Buying Behaviour towards Food Products of FPOs was conducted to analyze and examine to improve the standards for food products of FPOs.
- NASF FPO - Capacity Building Programs (39 with 1661 participants) on
  - Agribusiness Strategy and Agribusiness Plan for CEOs and Directors of FPOs
  - Value chain management
  - Collective Farming
- Buyer Seller Meet – 3
- Preparation of Business Plan – 2

- Consider FPO as a Start Up company
- Resource Institutions: Consultancy services (Successful ACC/ABC/ Retired Senior officials from private sector with experience in agribusiness / agribusiness incubators could also be identified to be a RI.
- FPO company space resource: A common place (office / processing unit / marketing yard) for the FPO (company) does not exist and due to resource and operational constraints, these firms could not establish one.
- FPO – market support – market linkages*: Market oriented agribusiness is vital for FPOs.*
- Financial support for FPOs: The FPOs should allowed to select the bank with which they would like to work with. Banks should be supported from NABARD so that these banks could fund the FPO as a Start-Up company.

B. Action Plan (2020-2023)				
Theme No : 1	**Title**		**Management of Agribusiness and Entrepreneurship**	
Name of the scientists and centre	**2020-21**	**2021-22**	**2022-23**	**Deliverables/ expected output**
Project 1. Assessment of Demand and Supply Pattern of Industry Human Capital in Agribusiness sector				
Dr.S.Hemalatha	Identification of agribusiness sectors and finalization of companies for the study	Study the organizational structure of the agribusiness sectors and Data collection	Designing forecasting model and Simulating the model	Prediction of human capital requirement in different agribusiness sectors for ten years from 2020 to 2030.
Project 2. Unlocking the Potential of Internet of Things – A case study on Agri-tech start-up model				
Dr.C.Muralidaran	Data collection, analysis and Report writing			Agri-tech start ups could benefit from the study
Project 3. Business Processes and Performance of Edible oil Processing (Traditional) Firms in Tamil Nadu				
Dr.C.Velavan	Primary data collection in oil processing unit Data analysis Report writing			Business performance of traditional processing firms and factors that influence the success of the firms could be known
Project 4. Impact of technology business incubator (TBI) on the clients performance				
Dr. M. Malarkodi	Completion of data collection, analysis & report writing			The effect of TBI on performance of clients would be identified

Theme No : 2	Title	Institutions for Agribusiness Development		
Project 1. A study of turmeric market system as a means to enhance the income of small and marginal farmers of Tamil Nadu				
Dr.D.Murugananthi	Data analysis & Report writing			Effective alternate marketing system

Project 2. An Evaluation of MUDRA Scheme in Madurai District				
Dr.N.Deepa	Data collection, analysis and Report writing			Benefits of the MUDRA scheme in the way forward to the development of entrepreneurship
Project 3. Study on present status of plantation industries.				
Dr.N.Venkatesa Palanichamy Dr. P. Balaji Dr.M.Chandra Kumar Dr.D.Murugananthi	Proposal to be submitted for external funding			Develop a holistic plan for sustainability of the plantation industry
Theme No : 3	**Title: Supply Chain and Value Chain Analysis**			
Project 1. Development of National Database on Millets and Establishing Benchmarks for Production, Consumption and Utilization of Millets				
Dr. N.Venkatesa Palanichamy, Dr.A.RohiniDr.M.Shanthasheela Dr.D.Murugananthi, Dr.M.Chandrakumar Dr.V.M.Indumathi	Data collection, analysis and Report writing			National data base on millets, trends in millet production; Benchmark on different parameters of production, and use of millet food products, establishing parameters for grading
Project 2. An Economic analysis of Meliadubia across multiple use benefits in Southern Tamil Nadu				
Dr.K.Divya	Data collection, analysis and report writing			Economics of multiple uses of *Meliadubia* in Western Tamil Nadu
Project 3. Evaluation of Farmer's Market in Tamil Nadu state				
Dr. K. Mahendran Dr. T. Samsai Dr.S.Moghana Lavanya Dr.A.Rohini Dr.K.Divya	Proposal to be submitted to Department of Agrl. Marketing and Agribusiness			Helps to strengthen the farmers to consumers linkage

C. Details of research projects

A total of six projects being implemented in the Department of Agricultural and Rural Management were reviewed. Out of which, one externally funded project was completed; two university sub-projects, two Core funded projects and one externally funded project are ongoing in the department.

Departments	Externally funded projects		Core projects		University sub projects		Total
	Compl-eted	On-going	Compl-eted	On-going	Compl-eted	On-going	
Coimbatore	1	1	0	1	0	2	5
Madurai	0	0	0	0	0	0	0
Killikulam	0	0	0	0	0	0	0
Valavachanur	0	0	0	0	0	0	0
Kudimiyanmalai	0	0	0	0	0	0	0
Kumulur	0	0	0	0	0	0	0
Mettupalayam	0	0	0	1	0	0	1
TOTAL	1	1	0	2	0	2	6

D. Remarks of the ongoing projects

S. No	Project Number and Title	Project Period	Project Leader (PI/Co-PI)	Remarks
I. Externally Funded Project				
1.	NFSM/CARDS/CBE/ARM/2019/ D001 Development of National Database on Millets and Establishing Benchmarks for Production, Consumption and Utilization of Millets	2019-20	PI:Dr. N.Venkatesa Palanichamy Co-PIs: Dr.A.Rohini Dr.M.Shanthasheela Dr.D.Murugananthi Dr.M.Chandrakumar Dr.V.M.Indumathi	The project may be continued
II. Core Projects				
1.	CARDS/CBE/ARM/2018/CP150 A study on marketing systems of turmeric as a means to increase the income of small and marginal farmers of Tamil	January, 2019-Sept., 2020	Dr.D.Murugananthi, Assistant Professor(ARM) Department of ARM	The project is to be completed on 30.9.2020

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2.	CARDS/MTP/ARM/2018/CP168 An economic analysis of *Meliadubia* across multiple use benefits in Western Tamil Nadu	January, 2019-Sept., 2020	Dr.K.Divya, Assistant Professor (ARM) FC & RI, Mettupalayam	Consortium of Industrial Agro-forestry – During completion of the remaining survey work, research should take sample farmers from Consortium of Industrial Agro-forestry, to capture the full benefits of the *Meliadubia* on farmers' livelihood. The project is to be completed on 30.9.2020
III. University Research Projects				
1.	CARDS/TRY/ARM/2018/001 Business Processes and Performance of Edible oil Processing (Traditional) Firms in Tamil Nadu	June 2018-June 2020	Dr.C.Velavan, Associate Professor(ARM) Directorate of Planning & Monitoring	The project may be completed on time
2.	CARDS/CBE/ARM/2020/001 Impact of technology business incubator (TBI) on the clients performance	Dec 2019 to Dec 2020	Dr. M. Malarkodi, Assistant Professor (HRM), Directorate of Agribusiness Development	The project may be completed on time

V. REMARKS AND WAY FORWARD

VICE CHANCELLOR

- One University Research Project will be mandatory for all Extension faculty
- Study on Impact of TNAU Varieties and Technologies may be completed in August 2020
- Performance of Extension and ARM faculties is to be improved in proposing Externally funded projects
- Brief Project Report on Medicinal Plants may be sent to the Director, Indian Medicine and Homeopathy, Chennai
- Feedback for the Project on DEMIC on the validity of the forecast and linking of Uzhavan app to send the SMS on forecast may be done.
- Impact of NADP schemes implemented in TNAU may be studied
- All the staff members are encouraged to propose more number of consultancy projects
- For speeding up GI of Mundu chilli, the PI may work with the Dean,HC&RI,Periyakulam.
- Many new microorganisms and processing are to be brought under IPR
- Recommendations of Dr.N.Sriram work be sent to Government i.e. as policy recommendation through the Director CARDS, Director of Research and Vice Chancellor
- Half yearly project report may be revived for all the research projects

DIRECTOR OF RESEARCH

- All the scientists are requested to propose new research proposals in Multi / Interdisciplinary mode by involving biological scientists as Co-PI
- Evaluation studies on marketing of agricultural products from farm to home may be taken up
- Research on crop insurance in collaboration with Department of RS & GIS,TNAU
- Policy brief need not be required for all the projects
- ICT and AI need modification
- Marketing channel need modification for more farmer's income.

DIRECTOR OF RESEARCH

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