



TAMIL NADU AGRICULTURAL UNIVERSITY
and
**National Institute of Agricultural Extension
Management (MANAGE)**

National Workshop on
“Agricultural Extension and Nutrition Linkages:
Towards Nutrition Security and Better Health”
27-28 February & 01 March 2017

WORKSHOP REPORT

Organized by
Home Science College and Research Institute
Madurai – 625 104
2017



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Home Science College and Research Institute, Madurai – 625 104
and



National Institute of Agricultural Extension Management (MANAGE), Hyderabad

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REPORT OF THE THREE DAY NATIONAL WORKSHOP

ABOUT THE WORKSHOP

The agricultural production and implementation of appropriate agricultural extension services are key components for assuring food and nutrition security. For reaching out to the community, strengthening the linkages between agriculture extension and nutrition is important to achieve food and nutrition security. Agriculture-nutrition linkage through effective technology dissemination and adoption is an emerging area for policy framing and implementation in developing countries like India.

The main draw on agriculture, promotion of extension activities, food and nutrition are such that they are closely inter-related since agriculture production assures food security through transfer of technology. Post harvest storage, processing and distribution systems and community nutrition are the fundamental areas which decide the policy frame work of the country in terms of food and nutrition security.

Also, important in this context are the three key entry points for agriculture-nutrition linkages which include agriculture growth, stability of food prices and empowerment of women in agriculture which can be achieved by expansion of agricultural services. Inclusive growth in agriculture helps in strengthening the linkages between agriculture and nutrition. This can be achieved by providing skill development and need based training in better processing and value addition technologies of locale specific farmers produces.

The shifting of consumption patterns toward non-cereals presents a good opportunity for small farmers to diversify their cropping patterns in order to improve both income and nutrition. Thus, diet diversification needs to be achieved, particularly in states with high rates of under nutrition. In this context, the increase in the production of non cereal crops like millets will help to tide over shortage of rainfall as these crops are drought tolerant. There is also an increasing demand for millets at large, on account of its nutritional and health benefits.

The current focus should also highlight the importance of pulses as they are the primary source of protein for the poor and the vegetarians who constitute the majority of Indian population. Hence there is an imperative need to make available healthy processed foods in the market, for which pulses can be exploited to provide good quality protein, micronutrients and dietary fibre.

Also, priority should be placed on exploitation of underutilized foods as they are neither cultivated in an organized farming system nor processed by established commercial processing methods. Most of the underutilized foods of the tropics are often available only in the local markets and are practically unknown in other areas. A large number of these foods are also known for their therapeutic and nutritive value and can satisfy the demands of the health-conscious consumers.

Post-harvest loss of these foods is a serious problem in developing countries. The total losses from harvest to the consumer point are as high as 30-40%, which is worth thousands of crores rupees. Value addition is thus an integral component of strategies to reduce post harvest losses of foods belonging to the different food groups.

Also, dietary diversification by bio-fortification and food fortification has to be promoted to bring the focus on nutritious crops. Market information also needs to be stressed for price stabilization, avenues for income generation, employment opportunities which helps for providing food and nutrition securities. Also food safety issues are of concern in the present scenario of demand for organic foods and processed convenience foods.

In this context, appropriate extension activities like community education programs for ensuring food security, food safety and household nutrition security have to be promoted for establishing effective linkages across agriculture, food and nutrition in achieving food and nutrition security for all.

RATIONALE

Good nutrition is the key to ensuring good health and well being of populations. However, the present scenario is such that millions lack access to nutritious foods which negatively impacts the health of women and children. Malnutrition is the underlying cause of 45% of child deaths worldwide and iron and calcium deficiency have been identified as key contributors to maternal deaths, putting mothers at increased risk of anemia and pre-eclampsia. Cross-sectoral planning between the health and agricultural sectors can promote maximum impact of agricultural policies on health and vice versa. It is thus imperative to underline the importance

of interlinking agricultural production, agricultural extension, food and nutrition to promote the general well being of the nation.

This can be achieved by putting in place the components of agriculture and post harvest systems by focusing on reducing food losses by improved methods of storage, processing, preservation, food safety assurance, establishing the linkages with the food industry and other stake holders. The focus should be towards production of nutritious health foods to promote good nutrition and health among all age groups particularly the vulnerable groups. Also stress needs to be placed on increasing the consumption of whole grains, fruits and vegetables and processing to alleviate micronutrient deficiencies through promotion of Knowledge Attitude and Practices (KAPs).

Adding value to foods helps the farmer not only to overcome food spoilage and losses, but also fetches high returns due to the newly added technology. It thus provides convenience and safe food to consumers and promotes diversification and commercialization of agriculture by providing linkages between consumers and farmers by promotion of effective agricultural extension activities.

PROGRAM GOAL:

Enhancement of capabilities through agricultural extension services to achieve nutrition security and better health.

OBJECTIVES

- (i) To create understanding on the inter-relationship between agriculture, agricultural extension and nutrition security.
- (ii) To address issues pertaining to nutritional problems at the national and global level.
- (iii) Promotion of knowledge on the importance of food processing techniques.
- (iv) Intervention strategies to overcome nutritional problems.

COURSE CONTENT

(i)	To create understanding on the inter-relationship between agriculture, agricultural extension and nutrition security.	<ul style="list-style-type: none"> - Agricultural development and its effect on food availability. Effect of food production and economic policies on food availability. Post harvest processing of foods and its impact on food and nutrition situation. Food distribution systems. - Linkages between agricultural practices - food production, food distribution and nutritional status. Crop failure and malnutrition – impact of poverty. Nutrition indicators, and their role in agricultural planning.
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(ii)	To address issues pertaining to nutritional problems at the national and global level.	<ul style="list-style-type: none"> - Food situation in India and in the world, food production and consumption trends. Food balance sheets. Assessment of nutritional status. Role of nutrition in agricultural planning and national development – dual burden of malnutrition. - Food and nutrition security at national and household level; nutrition policy implementation; nutritional impact of agricultural programmes, food price control and consumer subsidy; contribution of national and international organization for agricultural development.
(iii)	Promotion of knowledge on the importance of food processing techniques.	<ul style="list-style-type: none"> - Recent advances in processing and preservation of foods. - Importance of taking advantage of underutilized foods to achieve nutrition security. - Household coping mechanisms to achieve nutrition security – the gender perspective.
(iv)	Community based intervention strategies to overcome nutritional problems.	<ul style="list-style-type: none"> - National and international programs to address nutrition issues. - Post harvest technologies, fortification strategies, horticultural activities, nutrition education. - Planning and implementation of nutrition education program. - Knowledge management for improved food and nutrition security.

The National workshop was organized with the intention of imparting the relevant knowledge to the participants to address and solve locale specific problems which hamper food and nutrition security through effective agricultural extension services. At the same time it was envisaged to extent the relevant knowledge to identify and mitigate nutritional problems arising out of poverty and ignorance. This workshop will also help in empowering the participants to address issues related to the dual burden of malnutrition, which necessitates addressing micronutrient malnutrition on one hand and over nutrition on the other.

The Workshop was sponsored by the National Institute of Agricultural Extension Management (MANAGE), Hyderabad with a budget outlay of 1,55,000/-.

CONDUCT OF THE WORKSHOP

Under the above background, the National Workshop on Agricultural Extension and Nutrition Linkages: Towards Nutrition Security and Better Health” was organized at Home Science College and Research Institute, Tamil Nadu Agricultural University, Madurai during 27-28 February & 01 March 2017.

Participant registration:

The Brochure of the National Workshop was prepared and circulated for inviting the stake holders to participate and benefit from the promotional program. About 41 participants comprising of Assistant Professors from State Agricultural Universities/Private Educational Institutes, NGOs, Agricultural Department/CDPOs, Senior Research Fellows, Research Associates and Research Scholars registered, participated and benefitted from the Three Day National Workshop.



Inauguration of the program:

Following the registration of the participants, the inaugural function started with **Dr. G. Hemalatha**, Professor (Food Science and Nutrition) and the Course Director welcoming the gathering, which was followed by an introduction about the Dynamics of the Workshop. **Dr. N. Ragupathi**, Dean, Agricultural College and Research Institute, Madurai felicitated during the occasion and stressed on the importance of value addition to prevent food losses in order to achieve nutrition security. He highlighted about the importance of nutrition enhancement in different crops by increasing the soil fertility through fertilizer applications during cultivation of millet crops. He quoted that by applying the combination of NPK fertilizers in carrot cultivation would result in increase of β - Carotene by 42 percent. Also he stressed that increasing levels of Vitamin A, E and B₂ of millet crops could be achieved by Zinc application to the crops.

Dr.S.Parvathi, Dean, Home Science College and Research Institute, Madurai delivered the inaugural address and highlighted on the nutritional and health benefits of drought resistant millet crops and the importance of taking up of cultivation of millets and value

addition of millet based products to work towards food, nutrition and health security. **Dr. M. Chinnadurai**, Director, Center for Agriculture and Rural Development Studies (CARDS), Tamil Nadu Agricultural University, Coimbatore was the Chief Guest and delivered the Presidential address. During the presidential address it was emphasized to take up production of millet crops by adopting improved varieties and the need to attain self sufficiency in food grain production to meet. The significant improvement in agricultural production during the recent years was underlined to be sustained efforts of all our scientists and farming community who were ready to adopt to changing agricultural inputs and extension services. The information on proper storage methods of food commodities at household level to retain its nutrient content was suggested to be disseminated to the consumers and also pointed out the need to increase the income of farmers through increased productivity of food crops and adoption of suitable value addition technologies. **Dr. A. Janaki Rani**, Assistant Professor (Agricultural Extension), Home Science College and Research Institute, Madurai proposed the vote of thanks.



Day 1, 27.02.2017: Session I: Introduction

This session was intended to introduce the participants, facilitators and understand the training needs of the participants and was followed by the pre-evaluation knowledge test.

Knowledge test – pre-evaluation

Prior to the commencement of the technical program, the participants introduced themselves, following which they were given the pre-evaluation knowledge test questionnaire which comprised of 25 questions of one mark each to test the knowledge level of the participants in the areas of food, nutrition and health security.

Day 1, 27.02.2017: Session II: Agriculture, Advisory Services and Nutrition Security Linkages

Following the knowledge test, the technical session commenced, which comprised of four lectures, of forty five minutes each, and was followed by discussion session of 10 to 15 minutes. The topics of the session were planned to provide the necessary knowledge to the participants in the following main areas.

- Create understanding on the inter-relationship between agriculture and nutrition security.
- Role of biotechnology in achieving food and nutrition security.
- Reinstating importance of food processing technology for nutritional security.

Lecture 1: Topic: Linkages of Agriculture and Food Systems on Poverty and Nutritional Security

This lecture was delivered by **Dr. M. Chinnadurai**, Director, Center for Agriculture and Rural Development Studies (CARDS), Tamil Nadu Agricultural University, Coimbatore. He highlighted about the linkages of agriculture and food systems on poverty and nutritional security in India. The presentation emphasized on current agricultural scenario, the agricultural reforms like 'Right to Food' campaign, mid-day meal schemes, National Food Security Mission, green, white, yellow, blue revolutions and millennium development goals (MDGs) and its impact on poverty and women and child nutrition.



A need for a yard stick for nutritional security was insisted and focused on the 3A'S of food security namely Availability (Physical access), Accessibility (Economical access) and Absorption (Nutritional outcomes). The lecture also emphasized the role of agriculture in alleviating poverty and the need for policy interventions to achieve the nutritional security. It was concluded that agriculture productivity should be based on the nutrition requirement of the society and not to be lead by marketing or stake holder's demand. Also, he added that

shifting of agriculture processing into rural areas would create employment for the rural people there by increase standard of living. Strengthening of extension services, rural infrastructure and skill formation are essential for increasing productivity of agriculture. Also, ensuring sustainability and economic viability of smallholders and improving their competitiveness in production and marketing by facilitating better access to improved technology, inputs, credit and markets was expressed to be the need of the hour.

Lecture 2: Topic: Food insecurity and economic policies in India.

The next session started after the lunch break. This lecture was delivered by **Dr. Venkatesh B. Athreya**, Adjunct Professor (Economics), Rajiv Gandhi National Institute of Youth Development, Ministry of Youth Affairs and Sports, (GOI), Sriperumbudur, Tamil Nadu. In addition to speaking on Food insecurity and economic policies in India, the speaker also included in his presentation, the Agrarian changes in India - Food security and nutritional issues. The speaker elucidated the overview of India's agrarian economy from the year 1950 to 2014. He covered the cons of neo-liberalization, privatization and globalization which resulted in reduced access to institutional credit for agriculture, which in turn lead to sharp rise in real interest rates. He also added that opening up of economy to import agricultural products showed the way to crash in output prices and resulted in the massive agrarian distress *ie.*, many farmers committed suicide and there was stagnation in food grain output between 1998 – 2007, limited increase in productivity, slow growth of employment and food insecurity.

The food security at micro and macro level was also explained. At the micro level, problems of food security were location-specific, gender-specific with women facing unequal access in the intra-household distribution of food. At macro level, growth in food grain production was by accessing to physical availability, nature of growth in terms of employment, access to livelihoods and purchasing power. The speaker also broadly elaborated the concepts of availability, access, absorption of food and presented the current status of food security of the country by quoting details of National Food Security Act (NFSA). He concluded the session by highlighting the challenges with respect to India's food and nutrition security. He addressed the role of government in solving these challenges.



Lecture 3: Topic: Biofortification of crops for better nutrition

This lecture on “Bio-fortification of crops for better nutrition” was delivered by **Dr. N. Senthil**, Project Director, Centre of Innovation and Professor and Head, Department of Biotechnology, Agricultural College and Research Institute, TNAU, Madurai.

Dr. N. Senthil gave an introduction about the human evolution, human migration and evolution of grain dispersal system in barley, its domestication and fine mapping of genes in barley. He explained the concept of hybrid crops and bio-fortification of beta carotene in maize crops and iron fortification in pearl millet.



He added that the intensive agriculture led to the micro-nutrient deficiencies in soils and declined the soil health in many parts of the world like zinc deficiency in both soil and also in human. Zinc application to soil as zinc enriched urea would result in increased yield and also

zinc concentration in rice and wheat grains. The increasing demand in agriculture resulted in global use of nitrogen increased from 3.5 million metric tonnes (MT) in 1960 to 87 million metric tonnes in 2000 and it was projected to increase to 249 million metric tonnes by the year 2050.

The speaker also stressed the importance of ionome, which deals with improving our understanding of how plants take up, transport and store their nutrient and toxic elements, the knowledge of which can be exploited to benefit human health and the natural environment. Also the biotechnological tools used in the production of golden rice, *Bt* Brinjal was explained to the participants. The advantages, constraints and public acceptance / reservations for use of transgenic crops were addressed.

Lecture 4: Topic: Research focus in the areas of food processing for nutritional security

After a short tea break, **Dr. S. Kanchana**, Professor and Head, Department of Food Science and Nutrition, Home Science College and Research institute, TNAU, Madurai presented on “Research focus in the areas of food processing for nutritional security”. While giving a brief overview of the nutritional scenario at the global and national level, the speaker emphasized on the different food processing techniques which can be employed for food processing and preservation so as to minimize food losses and food wastage at different points in the food supply chain. The basic principles of food preservation was underlined with focus on the importance of appropriate packaging material and methods for specific fresh and processed foods, food safety issues and quality control standards etc.,

The presentation also encompassed the foods processing research which was taken up in the Department of Food Science and Nutrition, highlighting the research taken up by the students and also research taken up by external funded agency and as part of research funded by the University. The focus was mainly on millet based health foods, functional foods such as low glycemic index foods, gluten free foods for celiac disease patients etc., The technology developed by the Institute which were released by the University for commercialization such as multi grain adai mix, millet based dhokla, sorghum biscuits and sugar cane syrup was highlighted.



Visit to FOOD TECH 2017 exhibition

Madurai District Tiny and Small Scale Industries Association popularly known as (MADITSSIA) an organization serving for the development of Micro and Small enterprises for the past 42 years in the Southern Districts of Tamil Nadu. MADITSSIA had organised the FOOD TECH 2017 Exhibition during which there was a massive exhibition on Food Products, Food Processing and Packaging Machinery and allied industries from 24 to 27 February 2017. Some of the interested participants were taken to visit the exhibition on 27 February 2017 at Tamukkam Ground, Madurai, Tamil Nadu.

Day 2, 28.02.2017: Session III: Agricultural Extension and Community Based Intervention Strategies

This session comprised of three lectures which was intended to highlight the following issues.-

- Community based intervention strategies to overcome nutritional problems.
- Role of agricultural extension in achieving food and nutrition security to better health.

Lecture 1. Topic: Food and nutritional security in India - status and issues.

This lecture on Food and nutritional security in India - status and issues was delivered by **Dr. R. Rukmini**, Director (Food Security), MS Swaminathan Research Foundation, Chennai.

Dr.R.Rukmani, Director (Food Security) MSSRF, Chennai during her presentation on “Food and nutritional security in India - status and issues”, gave the definitions for food and nutrition security and then touched upon the history of food production and food availability in India since the independence of our country. She mentioned that there was a fivefold increase in food production in our country over the period from 1950 to 2013. The speaker also explained about the per capita net availability of cereals, pulses, milk, egg per day and stressed

on the current global hunger index of India and other countries. The overall macro scenario with respect to food production in the country was presented, while focus was placed on the importance of the National Food Security Act in enhancing the food security status of households. While emphasizing the important role played by the Indian states in ensuring household food security, the presentation also discussed the scope available for NGOs, and the role of M S Swaminathan Research Foundation in this context and the specific interventions undertaken by MSSRF in enhancing the household food security of the socially and economically deprived sections with whom they work.



The speaker emphasized that the vision of M S Swaminathan Research Foundation (MSSRF) was directed towards harnessing science and technology for sustainable and equitable development. In achieving this vision, they gave interventions to improve food security in covering seven states with 21 field locations. They encouraged local farmers to maintain nutrition gardens, community food grain banks for food access. Work was also in progress to promote better nutrition bioavailability through nutrition education for adoption of right food choices, nutrition literacy, safe drinking water, health and hygiene. One of the major program initiatives was that of Mahila Kisan Sashaktikaran Pariyojana (MKSP), which was started during 2007 by MSSRF with the objective of empowering the women and which was later adopted by our Indian government which focused mainly on grassroots institutions, sustainable agriculture and household food security.

The speaker concluded that the positive impacts of this MKSP would be beginning in the social, technological and skill empowerment of women in agriculture which will bring changes and rewrite the role of women in community and society.

During discussion with the participants, for one of the question raised by the participant on “What is the reason of increase in food price even after increased food production?”, she replied that demand and supply of food were not the main factor, while globalization, during policy making, the role of government in fixing the food price had to be regularized and there was an encouragement in private large-scale business companies to decide the price of food grains. So this could be the reason for increase in food price. Also she added that women should be involved in policy making level and primary education should be given to both girl and boy children and at the same time the school dropouts should be reduced to eliminate the gender inequality.

Lecture 2. Topic: Farming System Approach to Address Nutrition Maladies

This lecture on Farming System Approach to Address Nutrition Maladies was delivered by **Dr. R. Bhavani**, Program Manager, Leveraging Agriculture for Nutrition in South Asia (LANSA) MS Swaminathan Research Foundation, Chennai.



Dr.R.Bhavani’s lecture began with an introduction of presenting the nutritional status of rural children under age five. According to the survey, 42% of rural children under age five were stunted, 32% were underweight. According to Global Nutrition Report (2016), 48% of rural Indian women in their reproductive age group were found to be anaemic. She explained the concept of Farming System for Nutrition (FSN) which is a design that integrates nutritious crops,

trees, poultry, livestock, fisheries and agro- forestry, leads to tailor-made farming to address nutrition needs of rural families.

To implement the intervention strategies, 29 villages were selected from Wardha district and 21 villages from Koraput district of Maharashtra and Orissa respectively. She also presented the data on baseline survey of food consumption pattern and the challenges identified. Designing of Nutrition-sensitive farming system, crops- livestock-nutrition garden, developing crop calendar for nutrition garden, bio-fortification of fruits and vegetables in nutrition garden were some of the intervention strategies implemented in the study area. They also formed household / groups / community nutrition garden, school nutrition gardens, genetic garden of Bio-fortified plants, providing nutrition awareness at household level and school level by conducting competitions and organizing trainings. She also mentioned that the major challenges faced by them in implementing the programs were like erratic rainfall, threat of wild animal attack, lack of post-harvest technologies, etc,. She also explained the feasibility phases of their study such as assessing feasibility, sustainability measures and on-going dialogue for policy support.

At the time of discussion with the participants, she told that maintenance of nutri-garden at school levels were problematic during holidays and so they have requested village volunteers to engage in maintenance of the nutri-garden. At government level, under the public Distribution System, millet purchase from the villagers should be encouraged for distribution to public as per the recommendation given by the study.

Lecture 3. Topic: Role of Food Choices Linking Health Concerns with Nutritional Security

This lecture on Role of Food Choices Linking Health Concerns with Nutritional Security was delivered by **Dr. Sethuraman Sivakumar**, Senior Scientist (Agricultural Extension), ICAR-Central Tuber Crops Res. Institute, Thiruvananthapuram.

He gave an overview on the linkages among good food choice, health concerns and nutritional security and elaborated the food choice behavior and its relationship with healthy living. He presented the current status of undernourishment population of our country. In India, micro-nutrient deficiency / Hidden hunger, overweight and obesity are increasing due to lack of adequate physical activity and exercise, coupled with the high dietary energy intake which were found to be the major contributory factors.

He also explained the concept of food system transformation, which is a process that converts natural and home-made resources and inputs into food, food system revolution for example, the Quick Service Restaurants (QSR). He also briefed about the food choice models that linked health related behaviors such as health belief model, personal food system models, protective motivation theory and theory of planned behavior. He added that the basic motives for choosing /refusing potential foods like distastes, inappropriateness, disgusts, etc. The speaker also elaborated on the psychological eating disorders and the importance of sensory evaluation in food product development and consumer acceptance. He concluded that food factors influencing health such as fats and sugars are the giant killers and following the sense of satiety would be the new diet weapon.

Field visit

Following the lecture, during the post lunch session, the participants were taken on a field visit. The field visit was arranged to Gokul foods, Thiruvillan patti, Arumbanur Pudur, Madurai. Gokul foods is a small scale food processing unit which processes millet based ready to use instant food mixes such as *mudde* mix, porridge mix, supplementary and weaning food mixes, and other related foods from native pulses such as horse gram, cow pea, green gram, and black gram. The main aim of the visit was to expose the participants to the success of a self made women entrepreneur who was trained by this College.



This visit was followed by visit to Hema-Kannan Foods Pvt. Ltd., Iyer Bungalow, Madurai, the founder , Mrs. Hema Malini Kannan was the trainee of our college and has now started her own food industry. The Unit processes ready to use mixes and pastes like Biryani masala, puliyogare masala etc., Mrs. Hema Malini Kannan explained to the participants the struggle that she had to undergo to reach the present state of success in her entrepreneurial venture. She also gave the participants information regarding the need to be innovative in product

development, the process she underwent for obtaining of FSSAI license, standardizing product ingredients, process parameters, labeling requirements, marketing hurdles etc.,

Day 3, 01.03.2017: Session IV: Agricultural Extension and Community Based Intervention Strategies

This session was focused to provide the participants an understanding about the

- Knowledge management in assuring food and nutrition security.
- Crop diversity and dietary pattern linkages for food and nutrition security

Lecture 1. Topic: Role of Women in Achieving Nutrition Security

This lecture was delivered by **Dr.Krishna Srinath**, Former Director, ICAR-Central Institute for Women in Agriculture, Bhubaneshwar, Odisha.

The speaker explained about the concepts of food security at household level and role of women in achieving food security. She mentioned the multifaceted roles played by women in agriculture, as farmers in food production, as home maker in food access to all family members and as decision maker in food utilization like what food to buy and how to prepare it and how best to distribute food and also prevent food wastage. She also explained about the Indian scenario of food security, its challenges, and major steps to achieve food security and the role of women in developing household coping mechanisms to achieve nutrition security within their individual means and the available budget. She concluded her presentation by highlighting the importance of women in family farming by involving all the family members in farming and other allied activities. She also highlighted on the various multi-pronged welfare schemes and policies implemented by the Government for achieving food and nutrition security in India.



During the discussion with the participants, she reiterated that the status of women would be improved if the decision making power were given to women. Also the individual capability will be increased with the right education given to girl child and the importance of women empowerment through education, skill development, income generating activities etc.,

Visit to the Department of Food Science and Nutrition, Bakery Unit and Entrepreneurship Development Center

Following the lecture, the participants were taken on a visit to different Departments of the Institute, where they were explained about the research and outreach activities of each department. At the Department of Food Science and Nutrition, **Dr. S. Kanchana**, the Professor and Head exhibited the food products which were developed in the Food Processing Laboratory as part of student research and staff research activities. An exhibition was arranged to this effect and the entrepreneurship development activities of the department extended to SHGs, NGOs, and women entrepreneurs were explained in detail. The participants were also taken to the Bakery Unit and Entrepreneurship Development Center and were explained the related activities and extension services carried out for income generation.



Lecture 2. Topic: Knowledge Management for Improved food and Nutrition Security

This lecture was delivered by **Dr. D. Puthira Pradhap**, Principal Scientist (Agricultural Extension), Sugarcane Breeding Institute, Coimbatore.

The speaker started his presentation with an overview of the Sugarcane Breeding Institute. He detailed on the concept of data, information and knowledge and highlighted the role of knowledge management towards achieving food and nutrition security and also the role of ICTs in knowledge management. He explained elaborately about the influence of social

media, social networking by extension institutions, global forum on food security and nutrition and on-line journals, etc.. He also explained step-by-step procedure for setting up blogs on-line.



During the discussion, participants queried if any studies on application of on-line knowledge transfer by farmers was carried out by him. Dr. D.Puthira pradap replied that no such studies have been conducted, and that it was only through face to face contact wherein farmers shared their knowledge. But he stressed that it was high time that the farmers have to be prepared for tomorrows need and get closer to Digital India mode. He also mentioned that about 45 percent of villages in India are not having facility to access electricity and that we need to go a long way to achieve sustainability in agricultural production and distribution.

Lecture 3. Topic: Crop Diversity and Dietary Pattern Linkages in Agriculture Households

This lecture was delivered by **Dr. M. Chandrasekaran**, Director of Planning and Monitoring, TNAU, Coimbatore. He highlighted the trends in per capita consumption of major food commodities in India and per capita calorie and protein intake from different food commodities. He presented the status of production and utilization of various food commodities at the macro and micro level.

At the macro level, the changes in cropping pattern and farm production on one hand and dietary pattern on the other hand with reference to energy and protein intake, were discussed which were found to be harmony. On the other hand at the household level in certain regions this linkage was stronger and in regions like north-east and SAT regions, this linkage was weaker. Hence it was stressed to have policy frameworks in place to promote agriculture

production that is sustainable, and which contributes to food and nutritional security at household level. The huge population in India and China is still growing, and hence to meet the nutritional standards will be a time consuming process, but, a positive movement over time should always be considered as achievement. Hence, it was stressed to work towards farmer friendly approaches to reach sustainable agriculture.



Participant interaction

Dr. Saravanan Raj, Director (Agricultural Extension), National Institute of Agricultural Extension Management, Hyderabad gave a talk on integrating nutrition with agricultural extension and advisory services and also interacted with the participants. The participants were asked to share their views on linkages between agricultural extension and food and nutrition security. The participants replied that only through extension activities, the technologies developed at institute level could reach farmers at village level which would result in improving their knowledge on the importance of food and nutrition. Another participant replied that nutrition security could be achieved in rural families by creating awareness thereby reducing the malnutrition status of children and eradicating anemia among women. He added that malnutrition is a worldwide problem especially in children which could be addressed by nutrition specialists through extension activities to rural population. And such activities have to be regularly conducted by extension organizations.



Group discussion

The participants were divided into three groups for group interaction, experience sharing and generation of ideas. The participants were highly interactive and based on the group interaction, the recommendations were put forth for taking concerted efforts in our strive to achieve food, nutrition and health security.



Recommendations

- Establishment strengthening of linkages between academic, research agencies and implementing agency.
- Assurance of economic security of rural and urban poor through suitable welfare programmes.
- Encouragement of establishment of nutri-gardens in each household and creating nutrition awareness for better coping mechanisms at the household level to achieve nutrition and health security.

- Exploitation of moringa leaf for utilization in different diversified food products for nutritional security.
- Dissemination of information on nutritional research and other relevant information to achieve better nutrition and health.
- Success of food and nutritional schemes / programmes calls for a comprehensive approach involving men, women and children as a family support system
- Nutritional indicators and nutritional status assessment tools may be standardized as indices exclusive to the Indian community standards which may lend ease in comparison to WHO standards.
- Compulsory nutrition education programmes should be promoted at school level, which requires the appointment of a nutritionist in relation to student ratio.
- In addition to nutri-gardens in each household, community gardens may be promoted and the produce may be utilized by the care-takers and may also be marketed in the Farmers Shandy and local market.
- Nutritional garden should be established and managed by each school for better awareness from childhood level.
- Home science should be included as apart of course curriculum at school level.
- Food and nutrition awareness should be created at household level as people within the household meet act as catalyst
- At institutional level officials must act as catalyst to integrate nutrition with science.
- At policy level, the decision makes must act as catalyst to formulate nutritional science at community level.

Knowledge test – post-evaluation

After the technical and practical sessions, the participants were once again given the knowledge test questionnaire to judge the gain in knowledge as a result of the Workshop. This was conducted to mainly evaluate the knowledge of participants on in the areas of food, nutrition and health security. The questionnaire was evaluated before and after attending the training program to study the impact of training programme. The percentage of knowledge gain was increased to 36.63% after the completion of three day National Workshop.

Gain (%)	Average Pre Knowledge Score (%)	Average Post Knowledge Score (%)
36.63	38.83	53.06

Valedictory function:

During the valediction, **Dr.S.Amutha**, Professor and Head (Human Development) welcomed the gathering. **Dr. G. Hemalatha**, Professor (Food Science and Nutrition) and the Course Director presented the Workshop report and the recommendations. **Dr. Saravanan Raj**, Director (Agricultural Extension), National Institute of Agricultural Extension Management, Hyderabad delivered the Special Address and stressed on the importance of a comprehensive approach towards achieving food, nutrition and health security. **Dr.S.Parvathi**, Dean, Home Science College and Research Institute, Madurai delivered the Valedictory Address and highlighted the need to take up sustained efforts towards community based intervention strategies to overcome nutritional problems. During the **feedback**, the participants expressed that the Workshop was very useful and also requested for organizing of such programs with more practical sessions. On the occasion of the successful completion of the training program, certificates were issued to the participants. **Dr. B. Nallakurumban**, Assistant Professor (Food Science and Nutrition), Home Science College and Research Institute, Madurai proposed the vote of thanks.



Participant's feedback



Concluding remarks

Overall it can be concluded that the Three Days National Level Workshop on “Agricultural extension and Nutrition linkages: Towards Nutrition security and Better Health” was an opportunity for knowledge gaining and sharing of views and suggestions from experts in relevant fields. The participants had comprehensive overview of information starting from food and nutritional status, role of economic policies of India, research in food processing, farming system approaches, bio-fortification in food crops, role of women in achieving nutrition security and related areas. The participants felt that this was a unique Workshop which addressed the three pronged issues of food, nutrition and health security and the role of extension organizations in addressing these issues.



The participants and the faculty converged to take a group photo which we hope will serve as a reminder of the Workshop and also for reminiscing about the responsibilities which lie ahead of each scientist in working stringently towards achieving our vision of a nutrition secure India.