Participatory Technology Delivery mechanisms for coconut farming communities-

Experiences and lessons

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Coconut farming provides livelihood, nutrition, beverages, edible fat, ecological services and contributes to the state economy. The challenges of extension support, services and technology delivery and dissemination are the fragmented landholdings among coconut community and the number of farmers to be covered under wider agricultural extension umbrella. The field issues and constraints are expected to be individual and social based as well as resource base of the farmers. Technologies and practices are applicable in general across the community, but warrants delivery and extension mechanics specific to technology, crop or field problem for effective adoption by farmers.

Appropriate extension approaches for doubling farm income

Extension approaches had very crucial role in improving technology utilization, augmenting effectiveness of agricultural extension in technology dissemination, equitable access to stakeholders, refinement and participatory adaptation of technologies to suit resources and specific situations and thus paving strong and sustainable foundation for doubling of farm income. ICAR-CPCRI (Indian Council of Agricultural Research- Central Plantation Crops Research Institute) evolved the following extension approaches for solving the challenges posed in economically viable extension support and services, in collaboration with state extension agencies, local self governments and farmer organizations.

1. Participatory technology transfer approach (PTTA) for root (wilt) disease affected areas (Crop / field problem specific).

2. Livelihood improvement of rural women through bio resource management (Gender dimensions in extension and income generation).

3. Clustering coconut farmers for income and livelihood for overcoming limitations of fragmented holdings and varying resource base of farmers in technology adoption

4. Area wide community extension approaches (AWCA) for bio intensive management of RB of coconut (Technology specific).

5. Community based Participatory management for red palm weevil of coconut (Crop and field problem (pest) specific).

The features of these extension approaches eventually enabled the up scaling of the social processes and innovations to other areas with a paradigm shift of units of adoption from individual farmers to a wider contiguous area or farmer clusters, thus enhancing and ensuring the validity and feasibility of technology efficiency at individual level irrespective of resource base. The major features are participation of community and relevant stakeholders, intensive, need based extension strategies (integrated) for development, awareness, knowledge, skill and adoption, evolving social process and social mechanisms for technology adoption in

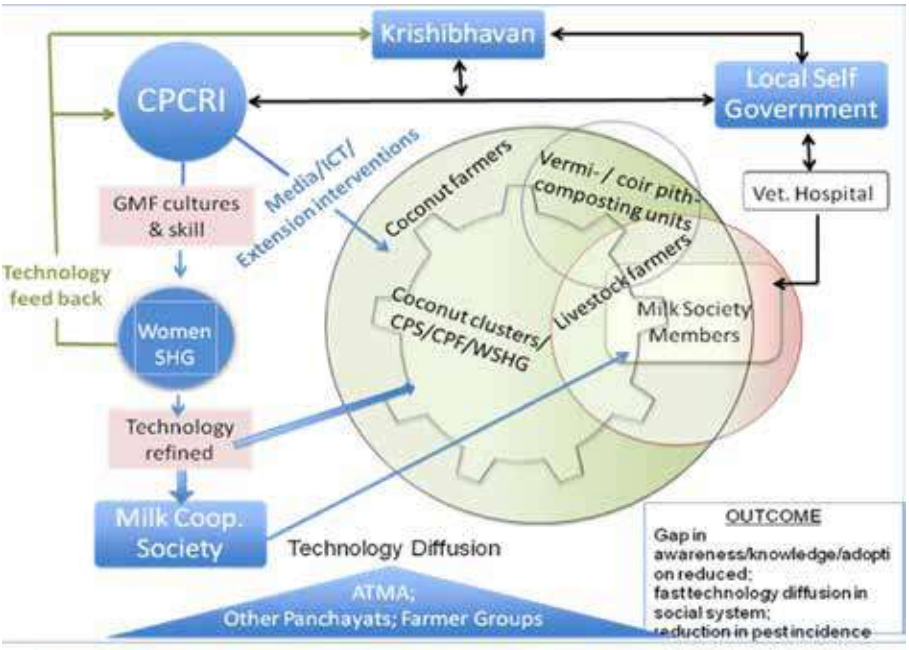

Fig.1- Community Extension Approach (AWCA) of Bio-management of Rhinoceros beetle

an area wide manner, efficiency of extension system improved and enabled rapid adoption process across society irrespective of socio personal economic inequalities.

Appropriate extension approaches ensembles inclusiveness, equity and plurality for making the process purposeful and result oriented (fig.1).

Coconut extension approaches – ICAR CPCRI experiences and lessons

Participatory Technology Transfer Approach (PTTA)

Coconut farmers faces several risks both in farming and marketing. One of the major risks was the debilitating root (wilt) disease of coconut, which is the most important factor for low productivity of palms in the disease affected tracts. The PTTA is a continuous social process requiring adaptation and refinement according to localities and the farming situations. The basic simple idea evolved, was based on the low level of confidence and motivation among farmers to adopt the integrated root (wilt) disease management package of technologies recommended by CPCRI. The adoption of recommended practices by coconut farmers in a contiguous area enables triangulations among the participant farmers and relevant stakeholders on the technical effectiveness and its impact in overcoming the risk and improving yield and income. The PTTA was implemented in 25 ha of (5000 coconut palms) contiguous area, involving 208 coconut farmers in Krishnapuram Panchayath around the CPCRI Regional station, Kayamkulam. The implementation phases were rapport building and dialogues with stake holders, participatory assessment of farming situations, documentation of farm and palm profiles, technology transfer activities involving society, technology implementation or community adoption, monitoring and follow up and finally participatory evaluation, through formal and informal methodologies like participatory observations, participatory rural appraisals (PRA), interface meetings of stakeholders and impact surveys. The pilot experiment /program were implemented around the ICAR-Central Plantation Crops Research Institute, Regional Station, Krishnapuram, Kayamkulam.

The Impact

The PTTA proved the potential of people's action consolidated and collaborated with extension and research system in reducing the dissemination gap, improving yield of coconut in root (wilt) affected areas adopting the recommended management package by 91.4% with an improvement in benefit cost ratio from 1.03 to 1.77. Health of the disease affected palms as indicated by the root (wilt) disease index score, also improved with sharp reduction in the disease advanced palms from 23.5 to 7.8 after interventions and apparently healthy palms improved from 12.6 to 18.8 percent. The yield gap reduction due to adoption of management practices were 62 to 88 percent when the approach was up scaled and the management gap in yield was 142 percent between the research station yield and farmers fields in WCT palms, indicating the potential. The improvement in awareness, knowledge, attitude and adoption of the integrated root (wilt) disease management practices was statistically significant and the approach being

inculcated in most of the development programs of coconut, giving a paradigm shift in extension program implementation and technology interventions.

Table 1. Impact of integrated root (wilt) disease management practices

Yield	Pre-project	Mid-project period	End of project
Average (nuts/palm/year))	24	32 (34.3 %)	46 (91.4%)
B C Ratio	1.03		1.77

Clustering coconut farmers/ farm families

This extension approach aimed at enhancing adoption and income from marginal and small holding coconut gardens. The social process included involving the whole farm family and selection of 50-125 farm families to form a cluster, cluster initiation and group management maintaining transparency in problem analysis and prioritizing, social mapping to document social/ economical/ agricultural and common resources, documentation of farm and palm profile, extension activity plans to bridge knowledge / skill groups, procurement of common inputs and adoption through farmer cluster conveners/ young farmers' club/ women self help groups, promotion of self perpetuating practices (like, basin management with cowpea, low cost vermin composting, backyard poultry, mushroom, azolla, intensification of intercrops, coconut value addition) post training support for micro entrepreneurs and linkage facilitation with other agencies.

Impact

The utility and feasibility of farmer cluster extension approach is that, it could enable equity of research benefits to farming community irrespective of the general prevalence of heterogeneous households in a social system. The yield of palms doubled compared to pre intervention data (from 34 to 75 nuts/palm/year) and the overall income from coconut increased by 71.3 per cent and 138.6 percent from other farming system components, even from homesteads of size up to 0.1 ha. Value addition activities of coconuts in the cluster area by women groups earned an additional value of Rs.9.40 per nut. The information exchange by the farmers also supported the validity of this approach with 20.57 percent disseminated to relatives, 23.33 percent to friends and 34.3 percent to other farmers. This approach also being scaled up as feasible extension approach in doubling income from coconut based homesteads.

Area wide community extension approach (AWCA) for bio management of coconut pest

The awareness, knowledge and adoption of bio management of coconut pests were reported to be less than 2 percent. The analysis of the causes indicated that an 'all to fit' extension approach could not achieve the desired results in field situations. Hence a participatory social experiment was designed and pilot tested in Edava grama panchayath in Kerala involving 5465 coconut farmers in an area of 520 ha with 1.105 lakh coconut palms of various age.

The community approach was initiated with participatory analysis about their preferences in managing the most widely affected pest of coconut, rhinoceros beetle. The three stages of the process were involving rural women farmers to IPM technologies in off campus programmes and convincing the visibility of technology impact, secondly rural educated women groups were trained in farm level Metarhizium (fungal bio agent for treating rhinoceros beetle multiplication sites- cow dung pits, FYM pits, coir pith heaps, compost pits, decayed coconut logs, etc) production and thirdly facilitated community based adoption (treatment of all the potential breeding sites of rhinoceros beetle in the entire panchayath involving milk cooperative societies, coconut producers societies, women SHG) in the entire panchayath as adoption cum participatory monitoring and evaluation campaigns.

Impact

The category of 'critical adopters' for bio management adoption (livestock farmers, compost units, coir pith processors- total 653 numbers) in the successful management of the social process were identified and effectively completed the process in two weeks. If the critical adopters were not identified and purposefully engaged in the adoption process the technology efficiency as well as pest management could not be achieved. The entire critical adopters and the coconut farmers in general were involved and 75.8 percent reduction in fresh incidence of the pest achieved. The knowledge and awareness, on the technologies and skills, increased to 60-70 percent among the farming community due to the extension approach. The inefficiency of

Comparison of the Extension Approaches in Coconut					
Sl No.	**Extension approach**	**Period of pilot testing**	**Level of participation**	**Social paradigms**	**Area /Unit of implementation**
1	Existing extension approaches for coconut Availing benefits of schemes/ projects.	1990-2000	Passive participation (Individual approach)	Linear transfer of technology	Household level. Adoption of technologies was very low.
2	Participatory Technology Transfer Approach (PTTA)	1999-2003	Participation by consultation and participation for material benefits	Paradigm shift to contiguous area and farmers clustering, direct interaction with research institution and society, Triangulation by multiple stakeholders	Contiguous area of 25 ha with 50 to 125 farm families. Convinced policy makers & extension officials regarding the need & utility of research in improving yield &health of palms.
3	Livelihood improvement of rural women through micro entrepreneurship in bio resource management Edava Women's Association (EWA) federated 22 micro Agri enterprises of women	2007-2008	Functional participation Cost sharing Evolved model of farm level integrated value addition of produces from coconut based homesteads Gender dimensions - access of women farmers to technology improved.	Gender based collective action, location specific bio resources for EDP (Thekkekara panchayath, Alapuzha district) Gender based value chain activities, facilitating technology adoption through farm level production (FLP) of Metarhizium as well as refinement and modification of FLP resulting 40 % cost reduction.	One panchayath – groups mobilization, group action, local bio - resources of 500 ha area Focus shifted to value addition and additional farm income Reinvented gender roles in coconut farming
4	Clustering coconut farmers/ farm families	2005-2008	Functional participation Cost sharing	Farm family participation of small & marginal land holders to attain economy of scale Coconut farmers clustered and evolved through group dynamics as rural institutions for appropriate decision making and prioritization at local level	25-50 ha of contiguous area of coconut and cropping/farming systems with emphasis to integrated farming systems (IFS) and value addition
5	Area wide community extension approach (AWCA) for bio management of coconut pest	2010-2013	Interactive participation and Functional participation Improved technology access and cost sharing for technology adoption	Joint analysis, formation of farmers local institutions (clusters), systematic and structured experiential learning	500- 1000 ha (panchayath wise) Identified the critical adopters in bio management of rhinoceros beetle for effective resource management in outreach programs
6	Community based area wide participatory surveillance and adoption- Coconut Red palm weevil management	2014-2016	Interactive participation and Functional participation	Socially responsible technology delivery and facilitating adoption across the social system through joint learning	1000 – 2000 ha of coconut cultivated areas

varied adoption, discontinuation, non adoption of bio management could be bridged through this approach.

Community based area wide participatory surveillance and adoption

Coconut Red palm weevil management

Red palm weevil (RPW) is one of the pest of palms causing crop loss and farmers are concerned about the spread of the pests and the practical difficulties in managing effectively due to the concealed nature of the weevil, difficulty in identification of the pest infestation well in advance and the scarcity of climbers for pesticide application and controlling the pest. ICAR CPCRI evolved a participatory extension approach in community based management of red palm weevil which was demonstrated in 2000 hectares of coconut in Bharanikkavu gramapanchayath of Alappuzha district in Kerala.

The components of implementation were, household based pan - area survey to GPS tagging of the red palm weevil infested, with pest life stages in active stages as well as dead palms due to RPW infestation, documenting other pests and diseases and palm/farmer profiles, analyzing the spreading pattern of the pest in farmers gardens in contiguous area, involving coconut farmers/groups/ women SHG members in the survey to inculcate the surveillance procedures in scientific manner, and consensus meetings for deciding integration of technology choices and social interventions. For the implementation of the extension approach field level practical training programmes and 42 group meetings were organized for the conscientization of coconut community and general public on the process and technologies to be adopted in eco friendly manner, formulated 'Coconut plant protection and surveillance groups' (CPPSG) equipped with pesticides/ fungicides (mostly bio products), sprayers, climbing machines, ladders and protective gadgets, ward wise Integrated coconut field clinics (ICFC) and support mechanisms with stakeholder representatives from local grama panchayths, coconut producers societies and federations, rural youths, scientists, Agricultural officer/extension officials etc. An exclusive mobile number was in unction for registering the incidence of red palm weevil in coconut palms and any other field problems to be tackled by the farmers or surveillance team. The technological interventions were phytosanitation (removal of dead palms, destruction of different stages of red palm weevil in palms, leaf axil filling), crown cleaning, spot application of Imidacloprid 1 ml /liter water in infested palms, treatment of all breeding sites of rhinoceros beetle in the panchayath with Metarhizium (fungal bio agent), and nutritional management of palms.

Impact

The community based extension approach was implemented in an area of 2000 ha in 174733 palms of 7068 households during 2014 and 2015. The pest infestation was reduced @ 30-89 percent in the 21 wards of the Bharanikkavu gramapanchayath with an overall average reduction of 55.83 percent. Rapid technology dissemination achieved across the social system within two year period against a record of 7.2 percent awareness/ knowledge on red palm weevil among farmers. Expenditure on pest management reduced by 57 percent due to community decision making and area wide adoption and improvement in knowledge by 88.44 percent among the coconut farming communities.

These extension approaches and strategies were evolved over a period of time and through participatory social process among coconut farming communities. The paradigm shift in technology adoption unit enabled area wide up scaling rapidly and with triangulation of stakeholders. A comparison of the extension approaches over a period of time is furnished as follows.

The effectiveness of innovation system depends on the will of political institutions, general institutional environment of the social system, need based realistic technology demand by coconut communities/farmers/entrepreneurs and effective mechanisms for supply of knowledge and technologies through collaboration and interaction. The traditional wisdom for supply of knowledge and technologies evolved in farmer generations over centuries, in coconut based homestead farming, and enhanced their livelihood and nutritional security. This component of innovation warrants special attention in coconut, a perennial crop which is part and parcel of farm families, culture, food and livelihood. Any extension system cannot reach every farmer effectively. The extension approaches evolved in coconut could bridge the gaps of reaching out to more number of farmers in unit area (98 % small and marginal land holding in Kerala state), situation/crop/problem specific delivery mechanisms, ensuring social responsiveness and networking for technology access and evaluation, enabled experiential learning and real time feedback, refinement and achieving technology appropriateness. ■