

Gender-sensitive agri-horti cropping model:

A transformative approach for livelihood enhancement

Sahu Ankita, R S Panda and Lipi Das*

ICAR-Central Institute for Women in Agriculture, Bhubaneswar, Odisha 751 003

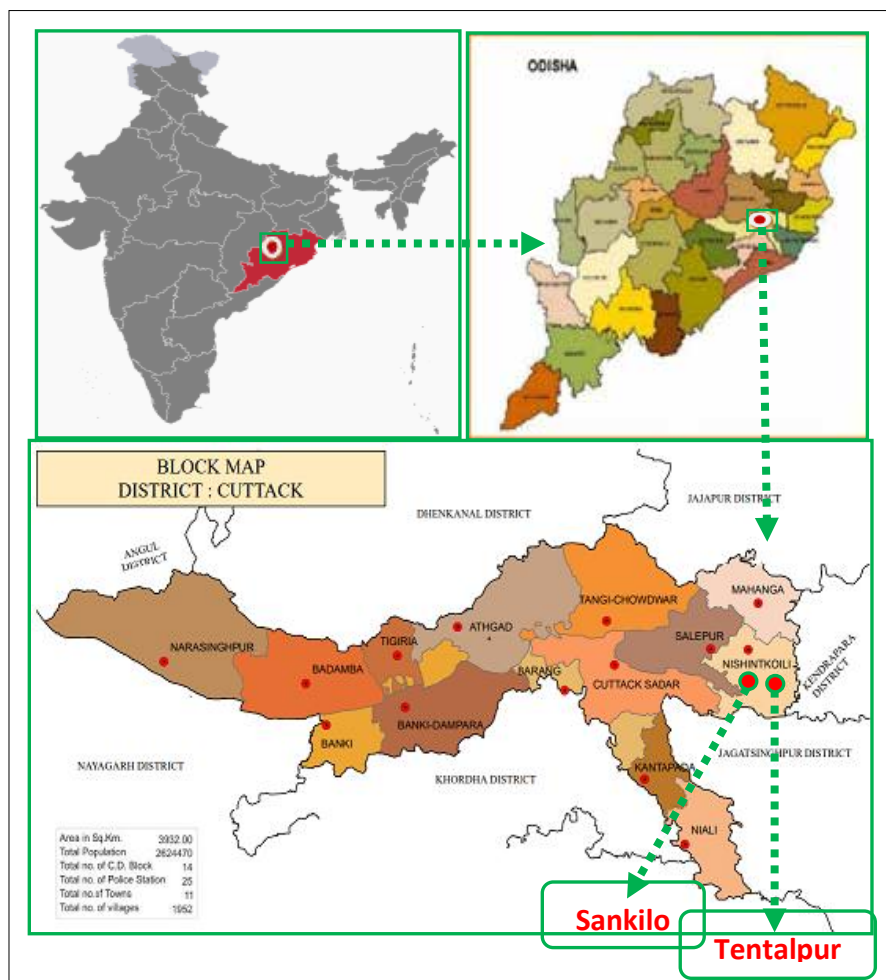
The trending feminization in agriculture necessitates mainstreaming farm women with the commercial actualization of farming by designing women-centric cropping models and extension approaches, which addresses their farming issues and upgrade them with latest technical know how in agriculture to enhance their livelihood. Bridging the gender gap in agriculture by integrating women-inclusive strategies will enable in transforming Indian agriculture. With this back drop, ICAR-Central Institute for Women in Agriculture attempted to empower the farm women of eastern tropical region with gender-sensitive agri-horti livelihood enhancing cropping model. The model caters predominantly to the needs of rice women growers of the region, who also cultivate need-based seasonal vegetable crops. The introduction of high yielding rice varieties like CR-Dhan 307 (Maudamani), CR-Dhan 409 (Pradhan Dhan) and CR-Dhan 312, resulted in phenomenal yield enhancement of ~30–60%. Crop diversification in medium land paddy with relay cropping of black gram, variety PU-31, resulted in a yield enhancement of ~25–30%. Similarly, transformation of conventional vegetable farming with improved package of practices resulted in increasing production potential by ~25–50%. The livelihood model adopts a women-centric approach which aligns with farm women's needs and preferences.

Keywords: Agri-horti model, Farm women, Livelihood enhancement

THE up-gradation of Indian farming from subsistence to commercial level is occurring at a moderately sluggish pace and still a wide segment of agrarian population is performing primitive farming for merely meeting their ends. The present scenarios of fluctuating economies, climatic aberrations, depleting resources, have imposed paramount challenges on sustainable income generation from farming. The emerging issue of reduced work-force in agriculture is also becoming a matter of concern, owing to swamping migration of male members to urban areas in search of service-related livelihoods. This trend is transforming Indian agriculture to be feminized. Hence, gender-sensitive approaches are required for sustaining the farm women in agriculture and enhancing their livelihood dimensions

through suitable cropping-based interventions. It is widely noticeable that farm women practice subsistence traditional farming mostly due to lack of awareness and sometimes due to poor reliability on modern farming technologies. Considering the significance of farm women as potential stakeholders of Indian agriculture and keeping in view their issues and needs, ICAR-CIWA (Central Institute for Women in Agriculture), implemented an ICAR-NASF (National Agricultural Science Fund) sponsored project in a cluster of two villages, viz. Sankilo and Tentapur under Nischintakoili block of Cuttack district of Odisha with the major objective of women empowerment by reducing the gender gap in agriculture by promoting livelihood in rice-vegetable based farming. In this context, a gender sensitive

agri-horti livelihood enhancement model was developed, which appeared to be instrumental in enhancing farm income of small and marginal women farmers by increasing the production potential of the major crops of the region. The model targeted to bridge the yield gap in paddy and several periodic vegetable crops through potential varieties and package of practices. Considering the effective spatial and temporal utilization, a second crop (black gram), mostly relay to paddy was also introduced as an additional income generating dimension for farm families. The model claims to be gender sensitive as it adopts a women-based, women-centric and women-responsive approach in every step of problem prioritization, constraint analysis, technology dissemination and final demonstration. With farm women



ICAR-NASF project adopted cluster

as the major clientele, a considerate approach was used, which were resource inclusive, simple and easy to adopt. The choice of varieties was on the basis of location-specific performance, yield potential and market preferability. A strategic approach was adopted in initially creating a gender sensitized environment, where in the women farmers were gradually molded and made adaptable with the extended technologies. The entire period of model demonstration was fostered with concurrent training, skill impartation and complete hand holding. The output of the model in terms of income enhancement through enhanced production resulted in a stratum of socio-economic upliftment among the farm women of the region. The gender sensitive agri-horti livelihood enhancement model though a stepping stone in livelihood enhancement in farming, embarked many success stories.

Supplementing rice farming with potential varieties and technologies

As a normal cultivation practice, the women of adopted villages tend to use traditional varieties year after year, which results in decline of yield potential over years of cultivation. To compliment the rice farming in the region with a perspective to make it lucrative, a strategy was adopted to introduce some promising potential cultivars. In this aspect, crop planning meeting was conducted at least twice a year, before summer (*kharif*) and winter (*rabi*) season with key farm women stakeholders and farmers from the cluster villages. Eventually, varietal demonstration of 3 newly released high yielding rice varieties, viz. CR-Dhan 307 (Maudamani), CR-Dhan 409 (Pradhan Dhan) and CR-Dhan 312 suitable for all the available ecologies, accompanied with complete package of practices were conducted in the year 2020-21 during wet seasons, involving 40 selected small and marginal farm

women of the adopted cluster villages. As critical inputs, farm women were provided with seed minikits of 6 kg each along with fractional quantity of fertilizers and pesticides. They were skilled and inspired to practice seed treatment with Carbendazim agro-chemical and *Trichoderma viride* (bio-agent), nursery bed management, line transplanting with young seedlings and fertilizer management. Seed production technologies for producing quality seeds for future use and post-harvest interventions for value addition were also disseminated for additional income enhancement. Other interventions extended included application of need-based pesticides, fungicides and weedicides; pest monitoring and surveillance, use of pheromone traps, Tricho-cards, Drachon-cards (bio-agents), light traps; nitrogen fertilizer management and green manuring with *Sesbania* (dhaincha). The entire period of technology impartation was accompanied with training and capacity development programmers, continuous monitoring and technical backstopping.

Strategic outreach: Farmers' field days at various stages of crop growth and crop cutting experiments (CCEs) at the time of harvesting were organized in the presence of beneficiary women farmers and non-beneficiary women farmers and farmers, local line department officials and project staff. These CCEs were followed by farmers' meets for experience sharing and participatory evaluation of the performance of introduced rice varieties and demonstrated technologies. The concurrent field days enabled in horizontal spreading of technologies among the co-farmers.

Outcomes: Introduction of high yielding rice varieties, having yield potential of 11.0 tonnes/ha and the grain yield advantages of about 30-60% in farmers' fields, resulted in an incremental income of ~50-200% over previously grown varieties, depending upon the land type, varieties, crop management practices and prevailing market prices.



On-farm trials of CR-Dhan 307, CR Dhan 409 and CR Dhan 312

Paddy-relay pulse cropping: A step towards crop diversification

Introduction of rice-pulse cropping system: After harvesting of *kharif* rice, high yielding black gram (var. PU-31) was introduced in the rice-fallow and rice local pulse system for obtaining additional farm income and maintaining soil

health conditions. Additionally, the technology appears to be input inclusive as the sequential crop (black gram) grows in the residual soil moisture without use of fertilizers and other agro-chemicals. An average yield of 2.95 tonnes/ha was recorded in the black gram, variety PU-31, with an increase

yield of ~25–30% over previously grown varieties.

Varietal replacement in vegetable farming: The farm women of the region grew several types of seasonal vegetables, usually before and after rice crop. As a practice, traditional varieties were cultivated without following

Case study of a successful high yielding rice variety adopter

Mrs. Manjulata Mohanta aged nearly 53 years, from one of the adopted villages, Tentulpur of Nischintakoili block, Cuttack district of Odisha is a marginal farm woman, owning less than one ha of land, which she used to cultivate *kharif* paddy in 0.8 ha, primarily for domestic consumption purpose and vegetables in 0.2 ha to sustain family livelihood throughout the year. She was growing paddy by using seeds of local varieties as a traditional practice, from which she barely incurred marginal returns to sustain her livelihood. After the implementation of ICAR-National Agricultural Science Fund (NASF) project in 2019–20, she got an opportunity to transform the traditional rice-farming by cultivating newly released improved high yielding paddy variety CR Dhan-312. As a part of the project beneficiary, she attended the intensive training cum demonstration programmes round the crop cycle, which enabled her to change the traditional rice farming practices with improved package of practices. She was provided with seeds of high yielding rice

variety, agro-chemicals (pesticides and fungicides) and fertilizers, etc as critical inputs for initial beginning,



Mrs. Manjulata Mahanta: Successful rice grower

learning and awareness through capacity building programmes to initiate cultivation of high yielding rice variety itself in the first year of project implementation. During the entire period, she was supported with necessary technical information and technology backstopping. In this process, her net return increased from ₹46,072/ha during pre-NASF period to ₹1,09,120/ha during post-NASF period with an increase in income by over 137%, i.e. highest among all the rice growing beneficiaries (Table 1).

Table 1. Average net return from adoption of new rice production technologies

Item	Avg. value of paddy during pre-NASF period (in ₹/ha) (2019–20)	Avg. value of paddy during post-NASF period (in ₹/ha) (2020–21)
Input		
Seed*	2000	0
Fertilizer	4290	3180
Agricultural operation	16630	4310
Machinery (Tractor and thresher)	4000	3600
Marketing	2000 (₹1000/trip)	2200 (₹1100/trip)
Total input	29,020	13,290
Output (return)		
Main produce (grain)**	66,792 (@3.68 tonnes/ha)	1,13,490 (@5.85 tonnes/ha)
By-product (straw)	8300	8920
Gross return	75,092	1,22,410
Net return	46,072	1,09,120

*Seed Value @ ₹40/kg (Input); **Grain Yield (Output); NASF, National Agricultural Science Fund.



On-farm trials of improved high yielding vegetable varieties

improved production practices. Being ignorant about suitable high yielding and hybrid varieties in different vegetable crops, scientific package of practices pertaining to management of nutrients, pests and diseases, post-harvest care and packaging for marketing, resulted in incurring marginal profits from vegetable farming. Therefore, with an objective to enhance vegetable production in the region with a vision to maximize their net profits, introduction and demonstrations of high yielding and hybrid varieties of vegetables like cowpea (var. Kaveri), pumpkin (var. Arjuna), bitter gourd (var. VNR-28), brinjal (var. VNR-Utkal), ridge gourd (var. VNR-102), okra (var. Radhika), cucumber (var. VNR-Krish), chilli (var. Daya) were extensively carried out in the cluster villages. Under the livelihood enhancement model, over 40 farm women were provided with quality vegetables seeds along with fractional inputs comprising of fertilizers, pesticides, fungicides and plant hormones as critical requisite materials. They were trained and motivated particularly to practice seed treatment before

sowing to minimize the subsequent crop protection cost. Other simple yet effective technologies such as raising vegetable seedlings in pro-trays to obtain an early and healthy planting material; fertilizer management especially judicious use of nitrogen fertilizer and application of micronutrients; crop health management technologies such as application of need-based pesticides, fungicides, weedicides and hormones; pest monitoring and surveillance, use of pheromone traps, tricho-cards were also extensively disseminated. Other interventions included pre-cooling to remove field heat and to extend shelf life. The women farmers of the region were constantly supported with training and capacity development programmes, continuous hand-holding and technical backstopping.

Outcomes: With the introduction of high yielding and hybrid vegetable varieties among the farm women of the adopted village cluster, there was an increase in average gross return of ₹72,500/year and the average net return was ₹43,500/annum. With having good yield potential, an average yield

advantage of about 25–50% was realized in the farmers' field. This resulted in an incremental income of ~155–203% over previously grown varieties as represented in Table 2. The group approach in vegetable farming under livelihood enhancement model has generated a total income of ₹6,59,300 out of which a value of ₹98,895 of vegetables has been used for household consumption and ₹5,60,405 of vegetables were sold in nearby market.

SUMMARY

The gender-sensitive agri-horti livelihood enhancement model has improved the livelihood of the farm women through interventions like cultivation of high yielding varieties of paddy, pulse and vegetables in an improved scientific approach. The advanced cultivation of such crops which up-scaled the livelihoods were widely adopted among the farm women of the region, which also impacted their socio-economic conditions. The livelihood enhancement model has facilitated multi-fold to augment the overall income of the women farmer producer organisation (FPO) named Ananya Farmers Producer Company Limited and hence, sustained their livelihood. As a result of socio-economic upliftment of the farm women group, a significant reduction in the identified gender gap was realized in the project area, which ultimately aided in promoting empowerment of women farmers of the region.

*Corresponding author's e-mail: lipi.ciwa@gmail.com

Table 2. Comparative analysis of economic returns from vegetable cultivation in 1 ha between pre-intervention and post intervention period under ICAR-NASF project

Vegetable	Pre-NASF period (2019–20)			Post-NASF (2020–21)			Per cent increase in net returns or income (%)
	Total cost (₹)	Total return (₹)	B:C ratio	Total cost (₹)	Total return (₹)	B:C ratio	
Cowpea	60,320	1,04,957	1.74	1,16,000	3,12,000	2.69	197
Pumpkin	56,160	9,99,65	1.78	1,08,000	2,75,000	2.55	175
Brinjal	67,320	1,67,627	2.49	1,32,000	4,50,000	3.41	168
Bitter gourd	70,755	1,02,595	1.45	1,33,500	3,11,111	2.33	203
Okra	52,371	68,606	1.31	1,00,714	2,14,286	2.13	212
Ridge gourd	66,250	1,01,363	1.53	1,25,000	3,00,000	2.40	196
Chilli	78,573	1,86,217	2.37	1,48,250	4,75,000	3.20	155
Cucumber	99,707	1,28,622	1.29	1,81,286	3,79,464	2.09	195