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*Promotion of rural livelihood for sustainable
development of Mountain community*

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PROMOTING SUSTAINABLE LIVELIHOODS BY INCLUSIVE DEVELOPMENT APPROACH AMONG THE MARGINAL COMMUNITY OF NAUGAON BLOCK OF UTTARKASHI DISTRICT

PROJECT FOCUS AREA: Skill training and livelihood enhancement, Natural Resource management



BACKGROUND: Under project, the Naugaon Block of Yamuna valley of District Uttarkashi has been selected for improving livelihood. Nested remotely in the high Himalayas, the Banal Ghati & Yamuna Ghati is mainly inhabited by ethnic & indigenous communities dwelling twenty-five odd scattered villages dotting the landscape. Located in the rural area of Uttarakhand, Under project during the period of 3 years total of 2000 marginal



beneficiaries out of which 1250 directly & 750 Indirectly have been targeted to intervene. The project is implemented with a participatory approach by ensuring participation at all levels of planning & execution. The targeted group strengthened majorly on livelihood and natural resource management thematic areas of HDFC Bank Ltd. Over the 3 years, period project covered 30 villages of 2 geographic clusters, one is *Naugaon* and the other is Dhari Kafnol. Through project interventions, emphasis were given to enhancing the livelihood of small and marginal farmers by increasing the crop production and productivity by intensification, crop diversification (among citrus fruit and vegetable varieties), area expansion (bringing the new area under horticultural crops) improving the storage infrastructure and backward and forward market linkages for improving the marketing of produce. Thus, climate-resilient improved varieties added with better water management and better soil health management practices has ensured sustainable means of livelihood among the farmers in the future. Following is the brief narrative of major interventions carried out between 1st April 23 to till March'24 .

GOAL :

Empowerment of 2000 (1250 Direct &750 Indirect) marginal farmers in Yammuna valley of Naugaon block through organizing them in Farmers Interest Groups and building their capacities for better farm-based livelihood.

OBJECTIVES

- To improve the livelihoods and economic security of rural communities through farm production capacities and create a positive impact on their social and economic status.
- Strengthening planning & technical capacities of small & marginal farmers of target project areas through the introduction of eco-friendly and water-efficient technologies for livelihood improvement
- To provide diverse income generation options for sustained livelihood through self-help promotion system, smart technical interventions, and supply chain management.

MAJOR INTERVENTIONS:

STRENGTHENING FARMER INTEREST GROUPS “FIGS” FORMED UNDER THE PROJECT INTERVENTIONS:

To sustain good governance and internal management system & process among farmer interest groups “FIG” , it is a good and impactful instrument to organise their monthly meeting regularly so that they can discuss their progress, issues, and other development agendas under project interventions. During the year , a total of 360 meetings were conducted at FIG level as per the meeting schedule . The meeting agenda were majorly focused on strengthening production planning, internal management system and establishing good governance and transparence practices among institutions. As an outcome of strengthening process of FIGs about 80% of Farmer interest groups (FIGs) are now able to manage and sustain their farm-based supply chain. All FIGs are able to update group’s records at their own level.



DEMONSTRATION OF LINE SOWING TECHNIQUES IN VEGETABLE CROPS TO REDUCE SEED RATE AND OPTIMUM PRODUCTIVITY

During designing the project interventions, strategically to achieve the scale of good income, it was planned that each farmer will adopt 2-3 crops cycle of cash crops like Tomato, French Bean Cucumber, which were cultivated about 75 hectares land in various production season of the crops . Traditionally, the broadcasting practice of seed sowing is applied by farmer commonly in fields which required higher seed rate and does not support to plant growth and post-harvest operation due to crop intensity. Hence to reduce this traditional practice by introducing scientific technique of line sowing implemented in fields followed by proper field preparation. The technique reduced about 30 % seed rate as well as improved the yield and quality of demonstrated crops. Along with sowing practices knowledge transfer and skill training on best agronomy practices like Integrated Nutritional and Pest Management, grass mulching, irrigation, weeding etc were also carried out between the sowing to fruiting stages. Under the process 798 farmers belonging to 29 project villages were trained to sustain the knowledge management practices among marginal communities.



DEMONSTRATION OF WIRE STACKING IN TOMATO & CUCUMBER CROP :

Adopting new trends and interventions in farming always worked towards an increase in productivity. Therefore, under project intervention, it was proposed to increase the net productivity via technical interventions. Wire stacking in creeper crops is one the major techniques equipped to increase the per-plant productivity which will directly increase the net income of the beneficiaries. Wire stacking helps boost the growth of healthy plants, thus abolishing the previously used technique of stacking using hedges from the forest which leads to less productivity and more pre and post-harvest losses by being a vector to various bacterial and fungal diseases. The wires stacking technique provide a particular plant with all the required conditions for better survival and growth, as the plant receives good sunlight all the time and as sunlight is essential for photosynthesis which provides the plant with nutrition and development. Considering to benefits of wire staking technique and to achieve project's major mandate increasing income by improving per plant productivity, wire staking technology demonstrated with 200 selected farmers of Naugaon and Dhari Kafnol cluster mainly on 3 creeper crops i.e. tomato, cucumber and pole bean. During the demonstration, hands-on training to farmers regarding the appropriate process and technique were proved to targeted farmers. As an output, farmers reported about 12 % more productivity in comparison to traditional stacking technique and reduction about 16 % of pre and post-harvesting losses specifically in tomato crop due to adoption of wire staking technique.



IPNM APPLICATION & ADVISORY TO REDUCE CROP PRE HARVEST LOSSES AND BETTER GROWTH :

Integrated Pest management is a way to control insects without relying solely on pesticides. It uses long term prevention of pest. During the baseline survey and interaction with targeted farmers, it was reported that most of the vegetable crops of the project area of Naugaon block are majorly affected by a fungal infection, powdery mildew, and mosaic virus. Further, the French bean pod is majorly affected by aphids and thrips (pest that causes a huge loss). Similarly, in tomato the crop is highly affected by late blight disease, bacterial stem & fruit canker, early blight, yellow leaf, rough Vascular discoloration is commonly seen in split open stems and damage the fruit and cause huge pre harvest losses. Considering to above challenges in demonstrated crops, though farmers were provided good market-led and disease-resistant variety of seeds, but It is fact that a quality and per plant yield could not be achieved only through varietal introduction but also by adopting appropriate IPNM practices. Hence precise use of organic IPNM and advisory on demonstrated crops provided frequently basis to targeted farmers at FIG level through organizing regular field days. During field visits, considering to limited knowledge and skill on disease and nutritional deficiency farmers were intensively oriented on the appropriate application of IPNM input. As an result, recommended application of IPNM material and knowledge management process not only helps minimise of pre and post-harvest losses but also facilitates to sustain the farm-based income of marginal targeted farmers.



DIVERSIFICATION IN THE SOURCE OF INCOME BY COMMERCIAL VEGETABLE CROPS CULTIVATION – DEMONSTRATION OF CUCUMBER

The enhanced way of promoting commercial vegetable production for sustainable income for the marginal farmers of the rain-fed, fragile ecosystem of the Himalayan region, Under project strategically to achieve the scale of good income it has a plan that each farmer will adopt 2-3 crops cycle, Cucumber is one of them which was plan to be cultivated a minimum in .03 hectare/farmer. Thus, along with tomato and French bean, an improved variety of cucumber seed demonstrated with 85 targeted new farmers in total 5.1 hectares land. To develop a producer-owned supply chain besides of input support, experts' visit advisory services and exposure visits to technical and marketing aspects were provided to targeted farmers to enrich their farm skills and knowledge on promoted crops.



CROP EXPERT FIELD VISIT :

With all the farming interventions frequent visits of crop experts at the field level helps farmers to minimize the knowledge gap on production practice. During the year total 16 crop expert at Naugaon & Dhari Kafnol cluster were organized to targetd farmers . During the crop expert visit 550 farmers trained on better crop management and agronomy practices. Technical experts provide technical know how and knowledge management support on best farm management practices at in-house and farmer's fields to FIG members to achieve per-plant yield mandate set under project .



MONITORING VISIT BY HDFC REPRESENTATIVE :

Field-level monitoring visit on project interventions and review of project output is a systematic and standard protocol of HDFC CSR-project which is carried out every quarter prior to the disbursement of the next quarter's fund. During the year Program manager, Corporate Social Responsibility of HDFC Bank Ltd called four quarterly field visits followed by virtual and on-field mode. During the visits project manager interacted with the targeted farmers and monitored all the field level interventions and deliverables achieved during the quarter. Along with direct field-level observation, project manager deeply interacted with the FIG members for understanding the project output, knowledge adaptation level, relevance of institutions to increase income goal of the project, documentation system, and efficiency of market and supply chain of farm produces being facilitated by HARC .



HARVESTING AND MARKETING OUTPUT OF DEMONSTRATED CROP (PEA)

Harvesting of Pea crop which was demonstrated with 400 farmers in both clusters in 24 hectares of land. The entire crop was 75 days period which was plan to demonstrated in 2 crop cycle rainy and winter 200 in each crop cycle. With the project facilitation harvested crop (pea) were channelized by HARC by linking farmers with proper marketing channels based at Dehradun, Vikash Nagar, and Delhi where farmers supplied their pea crop and fetched better prices. The average price range of the Pea crop fetched by the farmers was between Rs. 35 – 45/kg, thus a total of **2,64,677** kg of Pea crop worth of **Rupees One Crore Nine lacs Eighty-six thousand seven Hundred and Twenty-nine (Rs. 1,09,86,729/-)** produced & sold by all 400 target farmer, which have significantly contributed in farmers' livelihood and achieving to overall goal of the project “ increasing income” .



HARVESTING AND MARKETING OUTPUT OF DEMONSTRATED CROP (FRENCHBEAN)

Through the project intervention, during the year, 600 farmers were federated under 30 FIG's , where they were guided and demonstrated with the cultivation of a determinate variety of French bean (dwarf variety) and Moreleda (Pole bean) where 400 farmers cultivated dwarf variety of French bean in 24 hectares of land during May to June and remain 200 adopt 2nd crop cycle i.e. July -August especially for pole bean. The



harvested crop was channelized through proper marketing linkages developed by HARC with various APMC market. As an output the price range Rs. 40-60/ kg fetched by farmers and sold approximate 217 MT of beans worth of INR 1,04,31685/.

INSTALLATION OF IRRIGATION TANK (GEO CUM MESH TANK) FOR PROMOTING WATER CONSERVATION & PRECISE IRRIGATION PRACTICES AMONG MARGINAL FARMERS

In the project area, most of the farm fields of the intervention area are rain-fed and rely mostly on rain for their production. Over the years, with sudden and erratic changes in climate, the iterations of the prolonged dry season have increased drastically, leading the marginal farmers with little or no production. Besides, having a land and water resource farmers can't cultivate any cash crops on this land, due to either water streams being quite far from farmland or situated at a very low or high altitude and rain water storage/harvesting is major challenges for rain fed farming area . Hence demonstration of GEO tank carried out with few selected project villages, proposed Low-cost farmer-friendly water storage GEO tanks can be easily install and re-located as per requirement. Under proposed interventions 3 water harvesting tanks (each of 15,000-liter capacity) along with 250 mtr HDPE (25mm) pipe to channelize water from the source to the tank demonstrated at 3 location (Dhari, Kalogi & Kwari) of the project area, which is directly impacting the livelihood of about 60 farmers by altering 03 Acres of rain-fed land into irrigated land and producing cash crops where water facility was not available earlier.

DEMONSTRATION OF "SHIVANSH KHAAD" TO MINIMIZE THE GAP BETWEEN SOIL AND PLANT HEALTH (45 UNIT IN 7 VILLAGES)

Promotions of eco-friendly farming to sustain the agricultural production system is the need of the hour. Therefore, under project intervention, minimizing to gaps between soil and plant health low-cost organic techniques like permaculture "Shivnash Khaad" need to promote massively.

“Shivnash Khaad” is a cost-effective means for converting bio-degradable material into organic fertilizer. It helps to enhance the absorption of water & water retention capacity. Shivansh Khaad unit demonstrated with 75 farmers in 17 selected villages of the project area. Along with the demonstration 30 farmers of the project area were trained as skilled cadre of Shivansh Khaad preparation.



FARMERS EXPOSURE VISIT AT KVK (H.P) REGARDING CROP MANAGEMENT & PRODUCTION ASPECT OF CITRUS CROPS:

During the year HARC conducted 2 training cum exposure visits to 40 selected farmers at Krishi Vigyan Kendra -Dhuala Kunwa (Himachal Pradesh) for better management of disease, insect-pest and nutrients management on citrus crops. During the exposure visit KVK Scientist provides training on improved cultivation and post harvest management practices on citrus crop which is a new crop for project village farmers. Along with management practices, resource person-orientated farmers on better soil health, and nutrient management of farm fields for better crop production. Along with KVK farmers also visited Nirmal nursery situated at Dharmawala -Vikash Nagar for understanding more on citrus varieties and cultivation technology. As an output farmers are now well aware of cultivation practices related to citrus farming and applying its management practices effectively in their plants field.



IEC MATERIAL DEVELOPMENT :

Information, education & communication materials played an important role to disseminate knowledge among large mass through various means like folders, pamphlets, flex posters, sign board, etc.. Under project, various activity cum demonstrations carried out with 600 farmers. Hence for branding project interventions and an indication of covered village, 05 sign boards containing village information and HDFC bank CSR branding's tag line were used in the signboard and same were installed in all selected 05 villages to visualize and brand project initiatives.



CONSOLIDATION OF THE DEMONSTRATED CROP'S SUPPLY CHAIN OUTPUT :

Under the project intervened, during the year total 600 farmers were federated under 30 FIG's formed, where they were guided and demonstrated with the cultivation of a Determinate variety of Tomato (Indam 1313 & 13405) and Cucumber (Malini), where 600 farmers cultivated tomato on 36 hectares and 85 farmers grown cucumber crop on 3.43 hectares of land. Along with that short duration and market-led French bean cash crop were demonstrated with targeted 400 farmers in 2 crop cycle, where Pea was demonstrated with targeted 400 farmers in 2 crop sowing cycles between August and November'23 . In over all worth of **INR 6,25,01,002** supply Chain developed by HARC, which has significantly contributed project's overall mandate of Increasing farmers' income. Following is the crop-wise producing, covered farmer and marketing status depicted in below table :



#	Crop	Targeted Farmers	Production (in Kg)	Total Amount (INR)
1	Tomato	600	799190	39273530
2	Beans	400	217300	10431685
3	Cucumber	85	33978	691821
4	Pea	400	264677	10986729
5	Colocasia	100	26981	11,17,237
Total amount (INR)				6,25,01,002

FARMER'S EXPOSURE VISITS WITH BUYERS OF DIFFERENT REGIONAL LEVEL MANDIES:

An exposure visit of selected farmers of the project area carried out at APMC market i.e. Vikash Nagar and Dehradun organised between 16 to 17 August 2023, the exposure visit was majorly focused on understanding the dynamics of the market and learning/challenges experienced during crop supply season. During exposure visits, buyers suggest that farmers should adopt digital technology for qualitative and quantitative production of demonstrated crops. During the interaction buyer also committed to sharing information about market price, crop's quality parameters as well demand forecast of tomatoes, pea and other crops grown in Naugaon Valley. Further to sharing learning gained during the exposure visits it was also planned that each FIG representative will share learning information to their respective FIG members during the scheduled meeting of FIG at the village level.



DEMONSTRATION OF CITRUS PLANTATION:

Under the project interventions, HARC has demonstrated 2000 saplings of citrus cultivar, as per climate suitability of lower region in Naugaon Valley. HARC have demonstrated saplings of citrus varieties (Sahi Sarbati and Nucelur) to the farmers in both cluster of Naugaon and Dhari- Kafnol with intent to promoting green vegetation/green canopy and crop diversification. Under project intervention Improved market led variety of lemon (Sai Sarbati) and Mosambi (New Cellar) saplings were demonstrated with 50 farmers belongs to Naugaon and Dhari Kafnol cluster. In the long term, citrus plantations will help create green canopy and sustainable food and economic security of the marginal 50 farmers. To ensure transplantation activity systemic and scientific manner, a technical expert was present in the field to provide hands-on training to farmers related to layout planning, pit digging, and better crop management at pre and post-harvest levels. Apart from this, 10 seasonal training on orchard management, layout planning of citrus crop were also provided to target farmers



DEMONSTRATION OF GARLIC CROP:

Under the project, HARC was demonstrated of traditional and improved variety of garlic. Strategically to achieve the scale of good income, garlic is one of market-led crop which was plan to cultivate a minimum of .03 hectare/farmer. Thus, during the crop season November'23 improved market led garlic seed Parvati was demonstrated with selected 100 farmers of upper regions of Naugaon Valley. Traditionally, the broadcasting sowing practice of seed sowing is applied by farmers commonly in fields, which require higher seed rate 10-12 kg per nali and does not support to plant growth and post-harvest operation due to crop intensity. Hence to reduce this practice followed by proper field preparation and line sowing practices ensured with targeted farmers of the project area, result of it total 6 hectares land were covered under garlic crop cultivation which will harvested during May -June '24 and will make a significant impact on increasing income of marginal Himalayan farmers of Naugaon Valley.



DOVETAILING FOR FARM MACHINERY BANK (POWER TILLER)

Under the project to avail farmer welfare development schemes, initiatives were taken to convergence support through Department of agriculture specifically for farm machinery bank, under which 4 power tiller were provide to 4 FIG members of project area. It is a common fact that agriculture is the prime source of livelihood but at present livestock population is decreasing result of it, farming is becoming more drudgery prone and expensive hence need base solution to farmer various solutions is being provided at development and government level. In Uttarakhsnd more than 80 % of farmers come under small and marginal category. They cannot afford large-size equipment with their small income. On the other hand, power tiller is comparatively less costly and are versatile machines which can perform farm operations mainly ploughing operation more efficiently than manually. The power tiller is suitable in hilly regions particularly on bench terraces small crop fields with steep bunds, The power tiller is very useful especially to women producers to improve their agriculture production, productivity and reduce associated drudgery. Under convergence program power tiller which were provided to the targeted farmer they are effectively using it for ploughing field which was very difficult earlier in terms of time labour and cost of work. Power tiller make easier to save time, cost and reduce marginal farmers work drudgery.



PROMOTIONAL SUPPORT TO FIG – PACKAGING MATERIAL, TO STREAM LINE SUPPLY CHAIN OF FARM PRODUCE-

It is a well-known fact that during the initial phase of FIG's no or very less packaging materials available with farmers to supply quality and packaged produce to buyers at targeted markets. Considering to it, reasonable promotional support of 1116 poly sac - Leno bags (40 to 50 kgs capacity for wholesale pack, weighing scale -15, plastic crates 475 nos for packaging of pea, tomato and garlic crop were provided to best 15 FIG, the packaging netlon bags are good for proper air passage to packed crop due to which higher level of post-harvest losses occurred during the transportation.

PROGRAM MONITORING QUARTERLY MEETING ON PROGRAM PROGRESS AND FINDINGS

During the year total 4 quarterly program review and planning meetings were organized end of every quarter. During the review cum planning meet project progress was presented to secretary, few occasions to governing board of the Himalayan Action Research Centre "HARC" . Quarterly meetings were majorly dedicated on presenting project progress, and output achieved during the quarter. The process were followed by a presentation, participatory group exercise, and whatever corrective measures were suggested by the secretary, and board of directors incorporated under the quarterly action plan and program implementation strategy .



Impact stories: Case study -

Case study: Pea crop significantly contributed in farmers income :

During the previous year 2022 under the project intervention, 400 farmers were federated under 20 farmers interest group "FIG's, where they were technically guided for the production of determinate varieties of Pea (GS10 & Greenwood), in 24 hectares of land. Improved pea crop GS-10 which was demonstrated during last week of December'22 and crop's harvesting started by March'23



and accomplished last week of May'23 . The entire crop period was about 75 -120 days. With the project facilitation of project, harvested crop (pea) were channelized by HARC by linking farmers with bulk marketing channels based in Dehradun, Vikashnagar, and Delhi where farmers supplied their pea crop and fetched better prices. The average price range of the Pea crop availed by the farmers was between Rs. 35 – 45/kg, thus a total of **2,56,760 kg** of Pea crop worth of Rupees **One Crore Nine lacs Eighty-six thousand seven Hundred and Twenty-nine (Rs. 1,09, 86,729/-** produced & sold by all 400 target farmers of 20 Farmers' Interest Groups "FIG" . which have significantly contributed in farmers' livelihood and achieving the increasing income goal of the project.

Mr. Anand singh Rana residing village Bajladi is a farmer of Dhari kafnol cluster. He has set an example for the farmers of the area by his exemplary pea cultivation on a small patch of land (0.06 hectares). Under the FDP funded project by HDFC Bank, 400 Farmers of the area were identified to cultivate demonstrated *G.S.10 and Indam Greenwood* varieties of Pea on 24 hectares of land. Under the project FIG's were federated at village level and farmers were provided with improved variety of pea seed and technical guidance from HARC's subject matter experts. Anand singh rana is one of the progressive farmer among selected 400 farmers in the area, he cultivated provided variety of Pea in 0.06 Hectare land and followed all the POP's and guidance provided by HARC. During the harvesting season a qualitative volume produced by Anand Singh Rana and through the marketing linkages developed by HARC at various mandies, he was able to earn INR 27,700 from the French bean crop grown in 0.06 hectares of land. He express his sincerely thanks to HDFC funded project for providing him an opportunity to join FIG and improve his livelihood income.



Mr. Mukesh Singh Chauhan belongs to Bingsi village of Naugaon cluster. He cultivation French bean crop in a small patch of land (0.06 hectares). Under the FDP project funded by HDFC Bank and implemented by HARC, identified variety of Falguni and Moreleda were demonstrated with targetd farmers on 24 hectares of land by 400 farmers. Under the project FIG's were federated at village level “FIG” further farmers had provided improved Variety of frenchbean seed and technical guidance from HARC's subject matter experts. Mukesh Singh Chauhan is one of the progressive farmer among selected 400 farmers in the area, he cultivated provided both varieties of French beans in 0.06 Hectare land and followed all the POP's and guidance provided by HARC. During the harvesting season Mukesh Singh Chauhan produced qualitative volume of *Falguni* and sold it through the marketing linkages developed by HARC regional level market , result of it he was able to earn INR 32,000 from the French bean crop grown in 0.06 hectares of land within in a 85 days crop period.



Hemlata Parmar of village Tunalka

It is well known that women play a critical and potentially transformative role in agricultural practices in mountain areas, **Hemlata Parmar** of village Tunalka (Naugaon cluster) is an existing example of such women empowering story. Being a rural woman she carries on all the household and field related day to day activities by herself. Under the FDP project, she cultivated French bean on 0.06 hectares of land and followed all the POP's and knowledge management intervention provided under project by the subject matter experts. She was able to cultivate French bean and sold their harvested crop through marketing linkages developed by HARC, she earned a sum of Rs. 26,000. Women like Hemlata Parmar are a true example of women empowerment and through her hard efforts, she continues to encourage marginal farmers of the area to do better in their farming.



Sitaram Dobhal:

Mr. Sitaram Dobhal from village Dhari Palli located in Dhari Kafnol cluster of Naugaon block. He has set an example to other farmers of the area by his exemplary tomato cultivation practices in a small patch of land (0.03 hectares). He cultivated, provided variety under project in 0.03 hectare land and followed all the package of practices guided by HARC. He followed a scientific method of ridge rows transplanting, cultural practices of IPNM



(Integrated plant nutrient

management), Insect & Pest control as well as wire stackings. During the harvesting season he produces a qualitative volume and through the marketing linkages developed by HARC at various APMC markets based in

Dehradun & Vikashnagar of Uttarakhand he earned INR 83,000 from a small piece (.03 hectare) of land within a 3 month crop cycle.



Sikandar Singh Chauhan:

Mr. Sikandar Singh Chauhan from village Kwari is a marginal farmer of Naugaon cluster. Under the project intervention 600 Farmers of the area were first federated in farmers interest group "FIG" further identified to cultivate for demonstrated variety *Indam 1313 and Indam13405* of Tomato crop. Sikandar Singh Chauhan is one of the progressive farmer among selected 600 who cultivated provided both varieties of Tomato in 0.03 hectare land and followed all the guidance provided by HARC for tomato cultivation. By applying adequate package of practice like nursery raising, transplanting, IPNM (Integrated plant nutrient management), Insect & Pest control, and effective utilization of GEO tank for irrigation. Mr. Chauhan shown remarkable example to other FIG members by quantitative and quality production of tomato crop. During the harvesting season which were started from July first week upto end August, he sold quality volume of tomato at regional level buyers and earned INR 1,10,000 from the tomato crop grown in 0.03 hectares of land.



Chanda devi:

Women play a critical and potentially transformative role in agricultural practices in hilly areas, Chanda Devi of village Khabla (Dhari kafnol cluster) is a living example of such women empowering story. Being a rural woman she carries on all the household and field related day to day activities by herself. Under the project implemented by HARC supported by HDFC Bank she cultivate demonstrated *Indam 1313 and Indam13405* varieties of Tomato on .03 hectares of land. She followed all agricultural practices and expert advisory at both pre and post harvest level and able to earn a sum of 98,000 rupees. Women like Chanda devi are a true example of women empowerment and through her hard efforts, she continues to encourage marginal farmers of the area to do better in their farming.



Shivansh Khaad” sustainable solution to minimize the gap between soil and plant health and increasing income of marginal farmers

Modern agriculture is largely dependent upon fertilizers. While they are vital tools for worldwide food safety, they also alter physiochemical and biological properties of the soil. The overuse of chemical fertilizers hardens the soil, reduces soil fertility, pollutes air, water, and soil, and lessens important nutrients of soil and minerals, thereby bringing hazards to environment. Therefore, adopting eco-friendly farming techniques to sustain the agricultural production is the need of the hour.



Under the project intervention, the goal is to bridge the gaps between soil and plant health by introducing low-cost organic techniques, such as permaculture ("Shivansh Khaad"). Permaculture focuses on utilizing organic biomass from natural ecosystems.

To promote this approach, HARC conducted village-level training and demonstrations on organic composting called "Shivansh Khaad". We aimed to sensitize and encourage the adoption of organic manure techniques at the community level. Under the project intervention, Farmer Interest Groups (FIG) were formed at village level and educated them on the benefits of 'Shivaansh Khaad' like :

- Reduced preparation time (18 days) of a high-quality compost
- Reduction in expenses incurred on chemical fertilizers
- Increased yield of crops
- Improvement in soil structure and its nutrient health
- Enhanced Microbial Activity

Additionally, 75 farmers were provided with practical demonstration to educate them on the process of preparing 'Shivaansh Khaad'. This involved preparation of 75 units of 'Shivansh Khaad' where 3:4 parts are made by sprinkling dry grass, fresh cow dung and green grass with water. After 4 days, first turn and second turn was done. It is turned 6-7 times a day at regular intervals. It was an attempt to demonstrate a sustainable way of growing food with a combination of ecology and indigenous knowledge, and to bring people together for an exchange of ideas and ensuring ecological sustainability.

Outcome: The 75 installed ‘Shivansh Khaad’ units are being utilized by beneficiaries. The manure being produced has high content of nitrogen, organic carbon, humus and other vital macro and micro nutrients. A total of 33,000 kgs. of manure was prepared by the farmers and used in their cash crops (Tomato, French beans, Pea and Cucumber). Farmers have adopted the technique of ‘Shivansh Khaad’ very well. Prior to its introduction, it took the farmers 6 months to 1 year to prepare cow dung manure. This led to delay in the availability of nutrient at the right time. Additionally, incomplete preparation of cow dung manure led to the application of raw cow dung in the fields. This practice resulted in crop infestations and losses by insects and pests. In response, chemical pesticides and insecticides were used more frequently to address these issues. After using ‘Shivansh Khaad’, the cost incurred on crop production have considerably reduced and the compost has taken less time to prepare.

Solar-based water lifting solution creating positive impact on livelihood and water needs of marginal farmers of project area

In Naugaon valley of Uttarkashi, 80% of the rains are dependent on Monsoons and are confined to two months (July and August). Remaining rainfall is received during winters months i.e., December to



February Throughout the rest of the year, water scarcity is a recurring issue, making it challenging to fulfill agricultural water needs. This situation is especially pronounced in the upper hills due to the unpredictable patterns of monsoon and winter rains, including early and late onsets and closures. These erratic weather

patterns have a detrimental impact on crop sowing and production. To address this problem, solar based water irrigation system along with a distribution system was installed in the Project area Mateda hamlet at Dhari Kafnol cluster of Naugaon block in 2022. The lifted and harvested water has helped in fulfilling the water requirement of demonstrated crops during the water scarcity period. The major objective of this technique was



to increase irrigation area and improve the income level of farmers through production of cash crops. The intervention has the target to increase at least 4 Hectares irrigated land of target 5 villages and

motivate farmers to produce commercial cash crops like tomato, French bean, pea etc. specifically in the uncultivated land which was previously not used due to lack of regular irrigation facility.

The main advantage of the solar water pump is that it reduces dependence on electricity and fuel and there is no recurring cost of electricity or fuel. Compared to conventional water pumps, solar water pumps require very little maintenance. Solar water pumps are an economical and environmentally suitable technology to supply water in remote locations like Naugaon. It is well known that diesel generators and grid electricity often emit CO₂, while solar pumps do not. Extensive use of solar pumps can lead to substantial greenhouse gas emission reductions. In Matera Tok of Naugaon block (Uttarkashi), 6 hectares of land of 5 villages had become barren for the last 15 years, due to lack of water.

Following the installation of a solar water pump for irrigation by HARC, an ample water supply is now accessible for both farming and drinking purposes. Around 50 farmers have experienced notable success in cultivating high-value crops such as tomatoes, French beans, and peas. Previously, crop cultivation in Matera Tok was severely limited due to the lack of water resources. However, with the introduction of the solar water pump, farmers are now able to cultivate a variety of cash crops, transforming their agricultural prospects. Tabulated below is a summary of crop production since March 2023.

S. No.	Crop	Targeted farmers	Area (In hac)	Production (in Kg)	Total Amount (INR)
1	Tomato	50	2	26,500	15,63,500
2	Beans	50	2	5,200	2,13,200
3	Pea	50	2	3,000	1,95,000
Total amount (INR)					19,71,700

Above is direct impact of created irrigation facility but as an indirect impact now farmers are also able to use excess water for Human and animal drinking purpose which was not possible earlier due lack of water facility in scattered hamlet.



Wire staking – technique reduced the women's work drudgery & enhances the income folds of marginal Himalayan farmers :

It is a well-known fact that many diseases and insects are present at the ground level which adversely affect commercial vine crops like tomatoes. Therefore, using a structured system to keep them away from ground contact is prudent. To provide support to these crops, farmers cut down wood from the forests traditionally which is not only time-consuming but also has a negative impact on the environment. The technique of Wire-stacking provides support to help keep plants off the ground while assisting in their upward growth. These structures made of durable, weather-resistant materials hold up to the crop and last the entire growing season. HARC undertook demonstrations to facilitate the usage of Wire-Stacking with 200 farmers in two clusters (Naugaon and Dhari Kafnol) of Naugaon block. Low-cost polymer wire stacking was demonstrated in 2-hectare land with targeted farmers mainly crops like tomato and cucumber. It is one the major techniques equipped to increase per plant productivity which has directly increased the net income of the farmers. It has also helped boost the growth of healthy plants of the crops, thus abolishing the previous technique of staking using hedges from the forest which led to less productivity and more pre and post-harvest losses by being a vector to various bacterial and fungal diseases. Normally to manage staking in .02 hectares it requires 2000 tree buses and took atleast 4 days to bring it from forest to crop field, so through intervention, in 4 hectare we can say that we reduce cutting of about 400000 tree bushes and save 2000 days work load of 200 farmers. The cultivated tomato was harvested between July to mid-August. It has also helped the crop grow healthier and reach its total potential output during its productive phase of life. It is not only re-usable but has also significantly reduced women’s drudgery and biotic pressure on forests. Its usage is ought to increase the production manifolds, thereby providing an adaptive opportunity to the rural & vulnerable families to climate change. Tabulated below is a summary of crop production output where wire staking were demonstrated with 200 farmers in 4-hectare land in tomato crop during crop season June to Mid August 2023.



S. No.	Crop	Targeted farmers	Area (In hac)	Production (in Kg)	Total Amount (INR)
1	Tomato	200	4	87416	45,78,226

Total amount (INR)	45,78,226
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Market-led Pea crop contributing women Farmer's Livelihood in remarkable way:

Anita Devi W/O Keshwanand marginal women farmer who belongs to Viveknand Kisan Utpadak Samuh Deval, village of Naugaon block of Uttarkashi district, She became an inspiration to other marginal farmers of FIG group. Being a marginal farmer she was unable to meet the daily needs of the family by traditional farming . Under the FDP project funded by HDFC bank, the Himalayan Action Research Center (HARC) federated him to as a FIG member in February 2023 . She availed proper training and guidance related to pea crop production, she followed scientific POP and cultivate Pea. She sown Green Peas in 0.06 hectares of



land. So far she had harvested about 496 kg of peas and still one harvest is remain. The price received for the harvested crop about Rs. 30/Kg, and earn Rs 14,880 income form small piece of lane with in the 3 month crop cycle which is very difficult to earn in a short period mainly in mountain remote hill . She further says that technical skills and knowledge management practices absolutely help marginal farmers like me to improve my food and economic security through promotions of seasonal cash crops cultivation .

ACHIEVEMENTS:

Following are the major deliverables achieved during the 28-month project cycle :

Deliverables	Achievement
No of community institution “FIG” formed & strengthening	<ul style="list-style-type: none"> Federate 1000 farmers into 50 FIG & 2 water users’ group
Increase in Income:	<ul style="list-style-type: none"> 100% of farmers adopted cash crops as commercial farming for their livelihood development. Linked 1000 farmers under cash crop production. Established 11.01 Crore supply chain within 28 months project period by engaging 1000 farmers in farm based supply chain . 95 % adopted line sowing, improved POP of cash crop production e.g. tomato, French bean. Increase per farmer income ranging between Rs. 90,000-1,00000/-
Area under vegetative covers-	<ul style="list-style-type: none"> Demonstrated 2000 Improved citrus cultivar of lemon and Mausambi , which create green canopy cover about 4 acres specifically in barren and non-cultivated land as well as serve the purpose of long-term economic and environmental security of 100 marginal farmers.
Area under irrigation	<ul style="list-style-type: none"> Covered 10 hectares of unirrigated land of 205 producer into the irrigated area through the installation of an eco-friendly solar water irrigation system. Install 75 Shivansh khaad unit in 06 villages to promote soil health management practices. Demonstration of Wire stacking technique with 400 farmers to reduce the negative impact of deforestation and women’s work drudgery, besides it is also useful to reduce to pre-harvest losses.

USERC- MUSHROOM SPAWN PRODUCTION CENTRE AT HARC- NAUGAON BLOCK OF UTTARKASHI

BACKGROUND-

Ranwai valley of Naugaon watershed is situated in the catchment area of river Yamuna. Nestled remotely in high Himalayas, the watershed is mainly inhabited

by ethnic & indigenous communities dwelling twenty odd scattered villages dotting the landscape. Agriculture remains the primary source of sustenance for a majority of residents who mostly belong to the socially backward castes. Farmers are marginal with small & scattered land holdings & mainly practice rain-fed agriculture. Once widely known for its fertile soils, the region is continuously witnessing aggravated effects of global phenomenon of climate change that has adversely affected the natural resources of the



area, especially the quality of soil, thereby threatening the security of food & livelihood of the region. It is very important to address the nutritional security of the region and providing them other sustainable mean of livelihood. Quality production of mushroom in the region can only be attained by providing quality spawn and better package of practices in the region. To overcome above challenges and gaps USERC Mushroom spawn centre has been establish at HARC Naugaon . The centre is not only bridging the gap between quality spawn production of different varieties of mushroom but also acting as training cum learning centre in the Ranwai region of Uttarkashi for progressive farmers, entrepreneur to diversify agri allied based livelihood. Following are the major activities carried out during the year.

GEOGRAPHICAL AREA : Uttarkashi district of Uttarakhand

OBJECTIVES:

- To develop quality spawn of various varieties (Button, Oyster and Ganoderma), for mushroom production in Himalayan region
- To provide the sustainable source of income and promote mushroom cultivation in the region
- To build capacity of progressive farmers, small entrepreneurs and researchers through trainings and demonstrations.

MAJOR INTERVENTIONS:

PRODUCITON AND MULTIPLICAITON OF MOTEHR SPAWN: Himalayan Action Research Centre established mushroom spawn production laboratory for developing quality spawn of mushrooms. Initial stage working on two types of mushroom spawn viz. oyster and button mushroom. Himalayan Action Research Centre source mother cultures from DMR Solan Himachal Pradesh and multiplying at HARC Naugaon spawn production laboratory for developing master and commercial spawn. During the year 2023-24 multiplying continuously mushroom mother cultures of oyster, button mushroom and developing 20 kg of oyster mushroom spawn for trial and training purpose in the laboratory.



ORGANISED TRAINING CUM EXPOSURE TO PROGRESSIVE FARMERS, SMALL ENTREPRENEURS :

To educate various stakeholders belongs to Naugaon valley during the year total 3 training exposure visit carried out at USERC entrepreneurship development centre (Mushroom spawn production centre) . though 3 structured event to 200 target stakeholders i.e. students, farmers, and youth entrepreneurs . The exposure cum training program was majorly focused on quality spawn production, mushroom cultivation process & its management like substrate preparation, method of spawning, casing, cropping, harvesting, primary value addition as well as the disposition of the used substrate. Adding to it, participants 'knowledge management on mushroom cultivation was built through hands-on training and practical demonstration.

The findings/ feedback of the exposure cum training indicate that program were found to be satisfied with respect to various aspects of mushroom training program organized by Himalayan Action Research Centre "HARC". During the training, Trainees suggested that such kind of training programmers were highly effective in meeting their expectations and they gained knowledge in different mushroom cultivation practices. Further, it also came during the program that, problems of the non-availability of quality of spawn, lack of knowledge management institute at the local level, knowledge on possible value addition by mushroom are some challenges expressed by most of the

participants. Hence such type capacity-building program through USERC EDP Centre initiatives jointly by USERC & HARC is very helpful to promote the cultivation and possible processing of mushrooms in remote hills, where very limited options of ideation of livelihood diversification and modern science skills. As an outcome capacity building of 200 participants on mushroom cultivation ensured, out of which few had adopted its cultivation and some are also acting as local-level trainers and providing training to others in their respective area.



Exposure visit of students regarding mushroom cultivation technology



Farmers visit in mushroom spawn production laboratory



Exposure visit of farmers regarding mushroom cultivation technology

VISIT TO DMR FOR KNOWLEDGE BUILDING AND MOTHER SPAWN PROCUREMENT:

Mushroom cultivation is a promising practice with proper skills and knowledge related to its cultivation practices. As per the major goal of the project to develop knowledge of stakeholders and farmers related to mushroom cultivation in the area it becomes the first step to gather knowledge and skill training to the staff that will further outsource the knowledge to farmers and stakeholders. Moreover a good mushroom spawn development requires quality mother culture that can be further used to make mother spawn and commercial spawn after the process of mass multiplication. Mother cultures and commercial spawns were procured from DMR Solan and staff was trained regarding the mushroom mother spawn production and cultivation. After collection of quality mother culture from DMR Solan, the task remained were to produce mother spawn from the mother cultures and cultivation of commercial spawn in prepared bags.



OUTPUTS:

- 200 Participants were aware about commercial mushroom cultivation.
- Participants aware about composting, mother culture multiplication & spawning technology for oyster mushroom cultivation.
- Farmers aware about mass multiplication of spawn for commercial mushroom cultivation.

ORGANISING CERTIFICATE COURSE TO RURAL YOUTHS ON MUSHROOM CULTIVATION & ITS VALUE ADDITION

BACKGROUND : As per the analysis done by the United Nations' World Population Prospects-2022, India's population is expected to swell up to 166.8 crores by 2050. India, which currently has one of the world's youngest populations, with 21% aged 15 to 24, will age by 2050, with the proportion of young people falling to 17%. Employment and entrepreneurial opportunities for youth –particularly those living in developing countries' economically stagnant mountain rural areas–remain limited, poorly remunerated, and of poor quality. Hence it is need of current and future to develop demand-driven and market-led skills & knowledge of rural youths which will not only serve the local economic growth but also contribute to achieving the global agenda of SDG. In the hill context, the community of the targeted region have small land holdings and cannot survive totally on agricultural practices. Thus there is a need of introduce and promotion of other mean of livelihood that can give both Livelihood and nutritional security. Hence with the intent to overcome current livelihood and skill gaps challenges specially to local youths, USERC Entrepreneurship Development Center has been established at HARC Naugaon with the financial support of USEC Dehradun. The center is primarily working on a knowledge management centre related to package of practices & achieve quality mushroom spawn production of mushroom in the Ranwai valley of Naugaon block. Now, its right time to expand its, services to a larger way with a systematic extension approach through organising certified training on all aspects in terms of production, processing and marketing prospects of Mushroom to the needy people, especially to rural youths. As we know youth is the future and key actor in moving rural economy and transferring right skills Even recently National Education Policy 2020, recognized the role of education in providing students with the right skills, it is also in line with the sustainable development goal “SDG”. Keeping the above facts in view certified training course on mushroom cultivation, spawn production, and Mushroom products processing and value addition has been proposed to impart for 120 rural youths of Ranwai valley in 8 batches (15 participants in each batches) . Following is a brief of categories wise training program organized during the year.



GEOGRAPHICAL AREA : Uttarkashi Ranwai valley of Naugaon block of district Uttarkashi.

OBJECTIVES :

- To build capacity of 120 rural youths on mushroom cultivation, spawn production and processing and value addition (college students, progressive farmers, small entrepreneurs and researchers) through a certified training program.
- To promote sustainable sources of income and technology skills on mushroom cultivation practices in the region.

MAJOR INTERVENTIONS:

CERTIFIED TRAINING PROGRAM ON SPAWN PRODUCTION TECHNOLOGY: Himalayan Action Research Centre “HARC” organized 02 training programs on mushroom spawn production technology to 30 youth at USECR EDP Centre -Naugaon Uttarkashi. The main objective of the training was to improve knowledge of participants related to mushroom spawn production technology with hands on practices develop better understanding and skill for better management of mushroom spawn production technology for better mushroom production. Under training program hands on training on media preparation, sterilization and multiplication of mother spawn, master spawn and commercial spawn of button and oyster mushrooms were provided to target group.



CERTIFIED TRAINING PROGRAM ON MUSHROOM CULTIVATION : In future, continuously increasing population, depleting agricultural land, changes in climate, water scarcity and need for quality food are going to be important issues in Himalayan region. To meet these challenges and to provide food and nutritional security to our people, it is important to diversify the agricultural activities in areas like horticulture. Indian diet is primarily based on cereals (wheat, rice and maize) which are deficient in protein. Mushrooms are one such component that not only impart diversification but also help in addressing the problems of quality food, health and environment

related issues. HARC organised 03 trainings program on mushroom cultivation technology to 45 youth of Ranwai valley to fulfill of knowledge gaps regarding commercial mushroom cultivation technologies like compost preparation, sterilization, spawning and management of mushroom bags in commercial mushroom units. The main objective of the training was to improve knowledge & practical skills of participants on better production technique of mushrooms cultivation. 4 days training program session was majorly focused on hands on training on preparation and sterilization of compost for button and oyster mushroom and Spawning of mushroom spawn, filling of mushroom compost bags and management of mushroom bags in commercial mushroom units.



Farmers training on mushroom cultivation



Practical demonstration on Oyster mushroom cultivation

TRAINING PROGRAM ON MUSHROOM VALUE ADDITION: One training program on mushroom value addition technology carried out to 15 women participants of Ranwai valley of Naugaon block of Uttarkashi During training practical demonstrations on various value-added products of mushroom like pickles, Jam, chutney and soup powder developed by participants. The 4 days training program session was designed with theoretical input, practical demo and hands-on on training so that at the end of program participants have full skills and knowledge on prospects and possible value additional opportunity by raw mushroom .



OUTPUT :

- Capacity building of 90 rural youth through certified training on mushroom cultivation, Spawn production and Mushroom processing & value addition..

PROMOTION OF DIGITAL FARMING

For promoting digital farming in hills of Uttarakhand . HARC with ESCO Pvt limited working with 3000 farmers of Tehari and Uttarkashi . Pilot based project is trying to transforming horticulture crops based value chain by leveraging services like satellite based farm monitoring & weather predictions, crop consultation with expert agronomists, accurate & rapid soil testing, and crop insurance. Under project HARC is acting as a facilitating agency to perform following task :

- On boarding 3000 farmers in Upaj app in 4 blocks of Uttarkashi and Tehri for promoting digital farming.
- Conduct base line survey of on boarded farmers for assessment of pre and post project evaluation .
- Carry out soil testing of 3000 target farmers for better soil and crop advisory .

GEOGRAPHICAL AREA : Uttarkashi Jaunpur and Narendra block of Tehri and Nuagoun and Purola Block of district Uttarkashi.

OUTPUTS :

- On boarded 2000 farmers under Upaj app
- Geo tagging of 2000 farm field & collected 2000 soil sample for testing and analysis .
- Conduct 1600 onboarded farmers base line.

DEVELOPMENT OF SEMI-DWARF AND DISEASE-FREE APPLE ROOTSTOCK IN PLANT TISSUE CULTURE LAB

With the objective of promoting horticulture sector among marginal farmers of Uttarakhand region, HARC had established plant tissue culture laboratory and continuously working on tissue culture raised disease free improving variety of apple planting materials. During the year, 2023-24 MM-111, M-793 and M-9 apple rootstock varieties were propagated in the laboratory, thus total 2632 no of apple rootstock were multiplied and rooted in vitro condition of lab transplanted in the field of HARC nursery at Naugaon Uttarkashi. Due to its resistance to disease and better yield, maximum progressive farmers proffered to graft rootstock over grafted seedling. Such needs of the state can be contributed by the laboratory which will reduce the dependency of farmers on other state for planting materials. Further to sustaining the laboratory total 1076 plants were sold to local-level farmers and line departments for further up scaling and extension.



VISITORS/VOLUNTEERS

During 2023-24, 31 different visitors visits to our center at Naugaon, Kaleshwar and Dehradun, around 13 people from education departments, 01 from forest and 02 from HDFC Bank, and CDO Uttarkashi experiences made the scheduled visits to the organization. In addition, regular networking and linkages were established with 16 other experts from various resource institutions and agencies. During the year, the organization also hosted 5 students from different universities for internship activities. During their internship with the organization, the students learned and provide assistance in rural livelihood promotion, forest conservation and livelihood, and plant tissue culture techniques. Apart of visitors, HARC also organized 6 training programs and trained 136 officials of line departments, farmers, students related to horticulture, off-season vegetable cultivation & food processing.

ANNEXUARE -1 -HARC BOARD MEMBERS

#	Name	Design.	Address	Skill/ Expertise	Education Qualification
1	Dr.Vandana Thapliyal, W/O Shri Praveen Thapliyal	President	Shiv Krippa Sangam Vihar- Chauras PO Killeshwar, Tehri Garhwal	Environment educator	D.Phil
2	Dr. Mahendra S. Kunwar, S/O Late Shri Kundan Singh Kunwar	Secretary	103, Engineers Enclave GMS Road, Dehradun	Environmental and livelihood development expert	D.Phil
3	Shri Ramesh Singh, S/O Shri Abbal Singh	Treasurer	Vill. Kulendu, Masauli, Chamoli, 246473	Livelihood development expert	Masters in Commerce
4	Prof. OP Kandari, S/O Shri Narain Singh Kandari	Member	C- 105, Alfa Tower, Haridwar- ISBT byepass road, Ajabpur Kalan, Dehrdun,	Rural Tourism development expert	D. Phil
5	Prof. D.R. Purohit, S/O Late Sh. Urbi Datt Purohit	Member	Vidhyadhar Shri kala, Veer Chand Garhwali Marg	Uttrakhand Tradition and culture expert	D.Phil
6	Shri. Ajay Agrawal, S/O Shr. D.L. Agrawal	Member	D-10 Tula's Garden 8 Kalidas Marg, Dehradun	Finance & Enterprise Development expert	Masters in Commerce
7	Shri. Uday Shankar Gupta, S/O Shri A. S Gupta	Member	100, Anand Lok New Delhi	Finance Management Expert	Masters in Commerce