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Empowering rural women in agriculture through training, demonstration and input distribution in Kargil UT Ladakh

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Abstract
This research paper investigates the impact of training and demonstration about new technologies and scientific know how on farm production and income of tribal rural women of remote villages of Kargil district. A total of 30 women across all the blocks in Kargil were selected and provided training on managerial skills so as to actively run and mobilize this women farmers and also technical support through institutional trainings, demonstrations, exposure visits etc. The impact of the training and demonstration was evaluated on the basis of per cent increase in production and income after and before the training and demonstration programme for two years. The farm women's recorded 33% increase in annual income from mushroom production as additional enterprise and 69-169% increase in income in same area with adoption of modified method of winter vegetable production and 25- 50% increase in yield of vegetables using mulching technology. The results indicate that there are greater possibilities of increasing productivity and profitability of agricultural crop with adoption of improved techniques and scientific knowledge.

Keywords: Women empowerment, Income, production, livelihood, improved technology, training, demonstration

Introduction
Ladakh agriculture sector is highly feminized, with 70.1% of the total workforce engaged in farming activities being in addition to her role as a wife, a daughter-in-law and as a mother. The dream of socio–economic empowerment of women will not be complete without empowering those who are living at India's last periphery especially tribal women living in remote area of Ladakh. Economic Survey 2017-18 says that with growing rural to urban migration by men, there is 'feminisation' of agriculture sector, with increasing number of women in multiple roles as cultivators, entrepreneurs, and labourers (Hans and Hegde, 2020) [1]

Methods
To uplift the socio economic status of the farm women in Kargil, a project on women empowerment, was initiated in 2020-21 under Department of Science and Technology (DST). The prime focus of the project was to mobilize women farmers through awareness programmes, provide them technical assistance through capacity building, and motivate them to generate on-farm as well as off-farm income through various activities.
A total of 30 women across all the blocks in Kargil were selected and provided training on managerial skills so as to actively run and mobilize this women farmers and also technical support through institutional trainings, demonstrations, exposure visits etc.
Demonstrations were laid out in the fields of women farmers to apprise them about productivity enhancing practices such as use of quality seeds and improved varieties, vegetable nursery raising under low tunnel, cultivation of non-traditional vegetables under mulching, Cultivation of winter hardy vegetables under green house in winter, Seed production of winter hardy vegetables.
Special on farm training on cultivation of mushroom, preparation of sauce, ketchup and tomato puree to help farmers supplement their incomes.

Results and Discussion
Skill training programmes play a crucial role in gaining the knowledge about the technology

by farmers and act as a ridge to enhance livelihood opportunities of women who are at a disadvantageous position and have a scant exposure to technical skills and knowledge.

Mushroom cultivation

Mushroom production as an enterprise has enhanced household nutritional security, provided gainful employment with income. With collective production and marketing, the tribal communities could experience multiple benefits, making it a win-win proposition for all.

Inspired by the easy method of cultivation, good yield and economy of production farmer from Village Bodh Kharboo and Wakha have started cultivation of oyster mushroom for the first time at small scale initially. As a result the beneficiaries harvested 1 kg per bag mushroom from a unit of 20 bags and sale at village and road construction workers @ Rs. 100 per 200 gram generate profit of about Rs.9000/- within a 1.5 months. The successful cultivation of oyster mushroom in the village encourages others to take the enterprise and contacted us for training and spawn.

Young entrepreneurs named Husniya Banoo from remote area of Kargil initiated mushroom farming after learning know how through training and demonstrations under the project at KVK Kargil in the year 2020. Now she has established her own mushroom unit and become a first mushroom trainer in the district. She used to get annual income of Rs.110500 (Table 1 and Fig. 1) from conventional farming. With intervention like mushroom cultivation her annual turn out has an addition of Rs.39000 from mushroom cultivation with 30% increase in income. Results from impact of training demonstration in Kathua district revealed that training has been effective in enabling the farmers to develop their skill and transfer them to their farm fields as reported by Sharma *et al*. 2019 [5].

Cultivation of warm season vegetables under mulching

Mulching technology were demonstrated at farmers field in areas like Drass and Shaker Chiktan Block to create congenial conditions for the crop growth where cultivation begins in June and crop likes tomato were not able to ripe in time due to short cropping system also with others benefit like moisture conservation, temperature moderation and weed control. It is reported that Black plastic mulch during the day time increase soil temperature and made it congenial for growth of the crop. Stopdan, 2015 reported 2 to 5 ºC higher temperature at 10 cm depth compared to that of non-mulched soil in summer in cold arid Ladakh

Scientific Nursery raising of vegetable

Seeds of vegetables which are well adapted to the agro climate of Kargil district were distributed to women farmers to take nursery raising as enterprise along with training and demonstration on scientific nursery raising. A good number of farm women were motivated for raising of vegetable nursery and seedlings have been sold and earned good price as the seeds were procured from authentic sources. A women farmer name Hamidabanoo raised nursery of different vegetable in the year 2021 at her farm and earned Rs. 6000 in a span of 1.5 month from seedlings from a small area (8 m^2)

Winter vegetable cultivation under green house

Cultivation of vegetables in winter fetch double price than summer in Kargil as we cannot see any fresh vegetables in the market. The traditional practice was sowing of turnip green in the month of February to harvest in March. During the winter of the year 2020 a women named Salama bee with the technical guidance of KVK started transplanting of newly introduced swiss chard, beet palak and Siberian Kale tolerant to low temperature and got first cutting in December itself and earned495 from Saberain kale, Rs. 530 from beet palak and 600 from Swiss chard per 1 m^2 area with 160%, 130% and 110% increase in production as compared turnip green with only Rs 184 (Table 2 & Fig 2) and this vegetable were made available in market for the first time and she was unable to meet the requirement due to huge rush of the public. Training and demonstration results indicate that there are greater possibilities of increasing productivity and profitability of the rice crop with adoption of improved techniques in Chamarajanagar district of Karnataka (Sunil *et al.* 2020) [3].

Seed production of winter vegetables

To meet requirement of seeds of winter hardy exotic vegetables the steckling of winter hardy vegetables raised in green house in the campus during winter were distributed among 35 women's across Kargil district for its seed production and huge amount of seeds of winter hardy vegetables were harvest in different villages to meet their seed requirement.

Table 1: Impact of Training and demonstration on production and income of farmer (Husniya Banoo).

Component Description		**Benchmark (Baseline period 2019-20)**			
Components	**Names**	**Area (Acre)/Number**	**Production (q/Liter/No.)**	**Gross Income (Rs.)**	**Net Income (Rs.)**
Field Crop	Wheat	0.50	9.00qt	13500	11300
Field Crop2	Barley	0.50	7.90qt	11850	9650
Livestock 1	Fodder	1.00	33.50qt	50250	45250
Livestock 2	Fodder	0.25	17.00qt	25500	22300
	Cow	2.00	1400 lt	28000	22000
Total				129100	110500
			Year 2021-22		
Mushroom cultivation			1.5q	39000	34000
Sub total				169100	144500 (30%)

Table 2: Impact of training and demonstration on Mulching technology in Kargil

Location	Altitude	Before training and demonstration	After training and demonstration	Impact of intervention
Drass, Bodhkharboo, Wakha, Chiktan, Sankoo, GM pore	Upper Belt (10, 800 ft.)	Grow only leafy vegetables, cabbage and onion	Grow tomato, cauliflower, French beans, cabbage, cauliflower under mulching	Good yield and size of the produce with 50% increase in yield and 25 days advance harvest.
Baroo, Paskum, Poyen	Lower Belt (8,780 ft.)	Cabbage, onion, tomato, cauliflower, carrot, potato	Grow water melon, muskmelon, cucumber and tomato under mulching	Sold Water melon and muskmelon to the neighbour for the first time

Table 3: Production of Leafy Vegetables under Traditional Vs. Modified Method of Production of a women farmer (Mrs.Salama Bee)

Methods of Production				Per cent increase in income over traditional method (%)	Number of harvest/ cutting
1.Traditional Method					
Crop	Yield (kg)m^2	Rate (Rs)	Return (Rs)		01
Turnip	2.3	80	184	-	
2. Modified Method					03
Swiss Chard	6.0	100	600	160	
BeetPalak	5.3	100	530	130	
Siberain Kale	4.5	110	495	96	

Fig 1: Training and demonstration on cultivation of oyster mushroom A) Washing of barley straw, B) Soaking of barley straw, C)Drying of straw. D) Spawing and Bagging. E) Mushroom flesh at KVK farm. F) Mushroom unit of young entrepreneur Ms. Husniya Banoo

Fig 2: Training and demonstration on cultivation of warm season vegetables using mulching technology

Fig 3: Training and demonstration on scientific nursery raising of different vegetables crops A) Under Low tunnel. B) Raised bed nursery raising. C) Plug tray nursery raising

Fig 4: Cold tolerant leafy vegetables during peak winter under green house of a women farmer (Mrs. Salama Bee)

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