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UTTARAKHAND

UTTARAKHAND

Best Horticulture State Award



Agriculture Leadership Award 2021

for promoting horticultural development and
production in the state

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Devbhoomi Uttarakhand Surging Ahead!

Along with the breathtaking, pristine beauty and holiness of Shri Badrinath Dham, the **State of Uttarakhand** is known for its picturesque agricultural landscapes and conventional Organic Farming!

Uttarakhand is the first and only province in India which elaborated an **organic farming policy**. The state has immense potential in the field of organic crop production. The key objectives of diversifying towards organic farming are to improve crop productivity, soil health and the price of the output, thus enhancing the income of the farmers.

Uttarakhand is surging ahead with cooperative collective farming. The socio-economic improvement initiatives by the Government of Uttarakhand in **Horticulture, Medicinal and Aromatic Plants Cultivation, BAKRAW and UTTARA** have become inspiring success stories. These benchmarks have been possible with the relentless, focused work done by the entire department of Agriculture and allied sectors in tailoring new initiatives suited to the mountain state.

Uttarakhand brings to the national market a vast range of fruits, vegetables and especially off-season vegetables that fetch high prices for farmers. Uttarakhand is emerging as a classical example of how an honest endeavour to give a new direction to farmers and give them the right training, fertilizers, seeds and other inputs can revitalize rural communities and stem migration.

Agriculture Today Group feels proud and privileged in bringing out a special edition on Uttarakhand Agriculture. Under the guidance of Secretary Agriculture **Dr R Meenakshi Sundaram, IAS**, the edition focuses on the promotion of organic farming and several very interesting government initiatives for rural prosperity and health security. The government support extended to the farmers of Uttarakhand in adopting new technologies and dimensions is exemplary.

On behalf of my team, I take this opportunity to thank the Government of Uttarakhand for their gratifying and overwhelming support in helping us plan this very special edition. Every meeting with Hon'ble Chief Minister **Sh Pushkar Singh Dhami Ji**, Hon'ble Agriculture Minister **Sh Subodh Uniyal Sir**, Hon'ble Animal Husbandry Minister **Mrs Rekha Arya Ji**, distinguished officials and progressive farmers was a learning experience. Our heartfelt gratitude to Dr Sundaram and his colleagues for an enriching journey that will fondly be remembered forever.

Here's to new opportunities and achievements

Fond greetings for an **extraordinary 2022** from Agriculture Today Group

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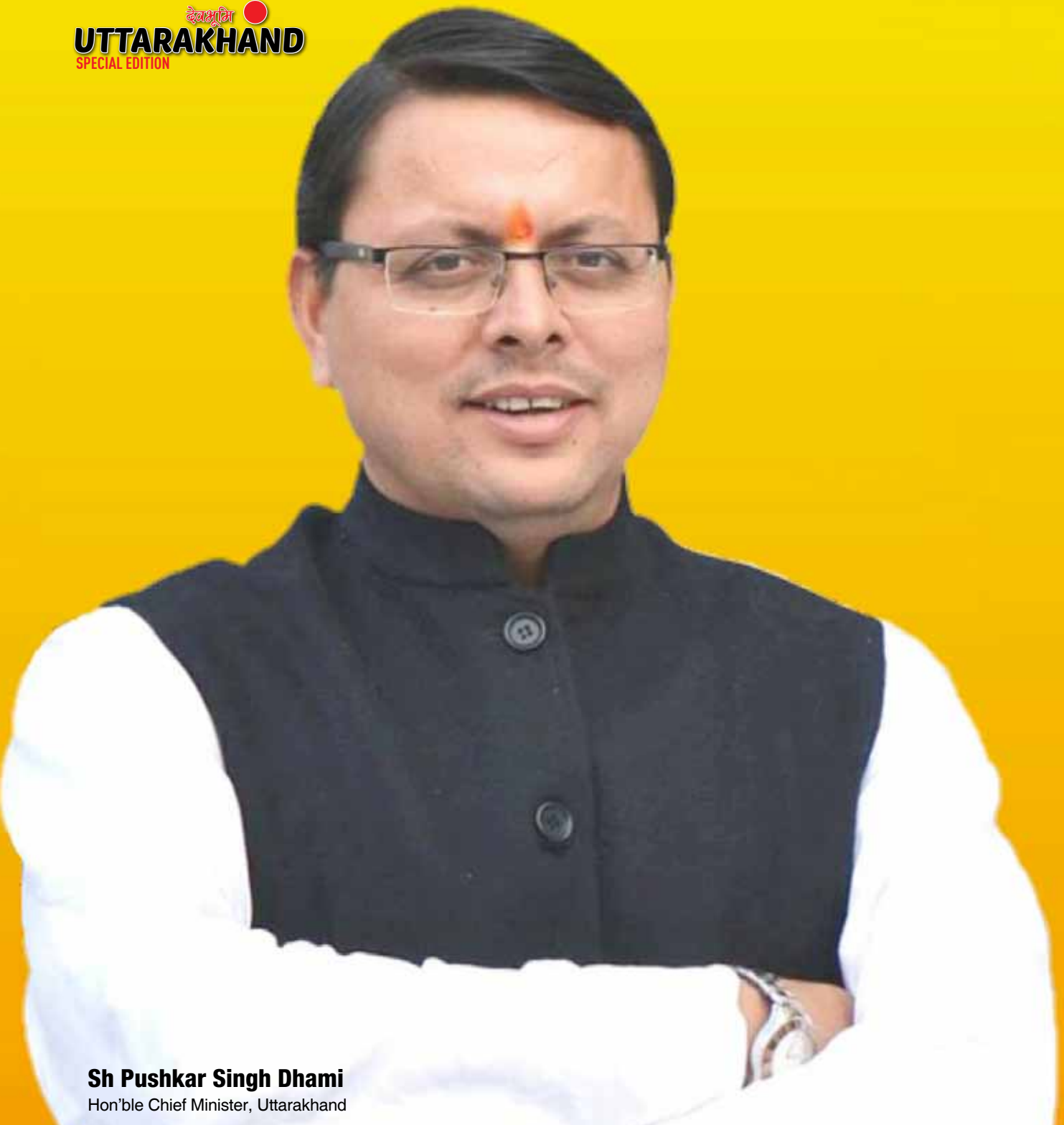
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Sh Pushkar Singh Dhami
Hon'ble Chief Minister, Uttarakhand

ATMA NIRBHAR UTTARAKHAND

**ACHIEVING FARMER PROSPERITY THROUGH
MULTIPLE VISIONARY INITIATIVES**

Agriculture is a significant contributor to Uttarakhand's Gross State Domestic Product. It is the chief source of livelihood for over 70% of the state's population. Commercial agriculture is practiced in the plains. Till a few years ago, the hill farmers were predominantly engaged in subsistence farming. This is changing with the visionary and proactive role of the government of Uttarakhand.

Uttarakhand has four agro-climatic zones covering six altitudinal farming approaches. There is potential to grow a wide variety of crops in the state. Because of our unique agro-climatic zones, a large number of crops are grown in the state including rice, wheat, sugarcane, maize, soybean, pulses, oilseeds and a number of fruits and vegetables. The Horticulture Sector of Uttarakhand has played a major role in farmer welfare. It is a significant contributor to our agricultural GDP.

In addition, our livestock and animal husbandry sector has significantly prospered in the last few years due to the multiple initiatives taken by the government.

Through the Multi-Purpose Primary Co-operative Societies, we are taking up cluster-based farming. We are developing the Integrated Model Agriculture Village

Success Of Multi-Purpose Primary Co-operative Societies

The cultivation of off season vegetables has been encouraged in Yamuna Valley. The produce is of high quality. Farmers are engaging in collective farming and marketing of the agricultural produce here. As a result, farmers have higher bargaining power now. Mother Dairy, Reliance Fresh and other corporate majors are procuring directly from farmers here. Over the last few years, collective farming has yielded very good results for the farmers. From a sellers' market, this market has converted into a buyers' market.

Through the Multi-Purpose Primary Co-operative Societies, we are taking up cluster-based farming. We are developing the Integrated Model

Agriculture Village. We are providing incentive schemes for crop loan. Through the Deen Dayal Upadhyay Kisan Kalyan Yojana, we are giving interest-free term loans to farmers.

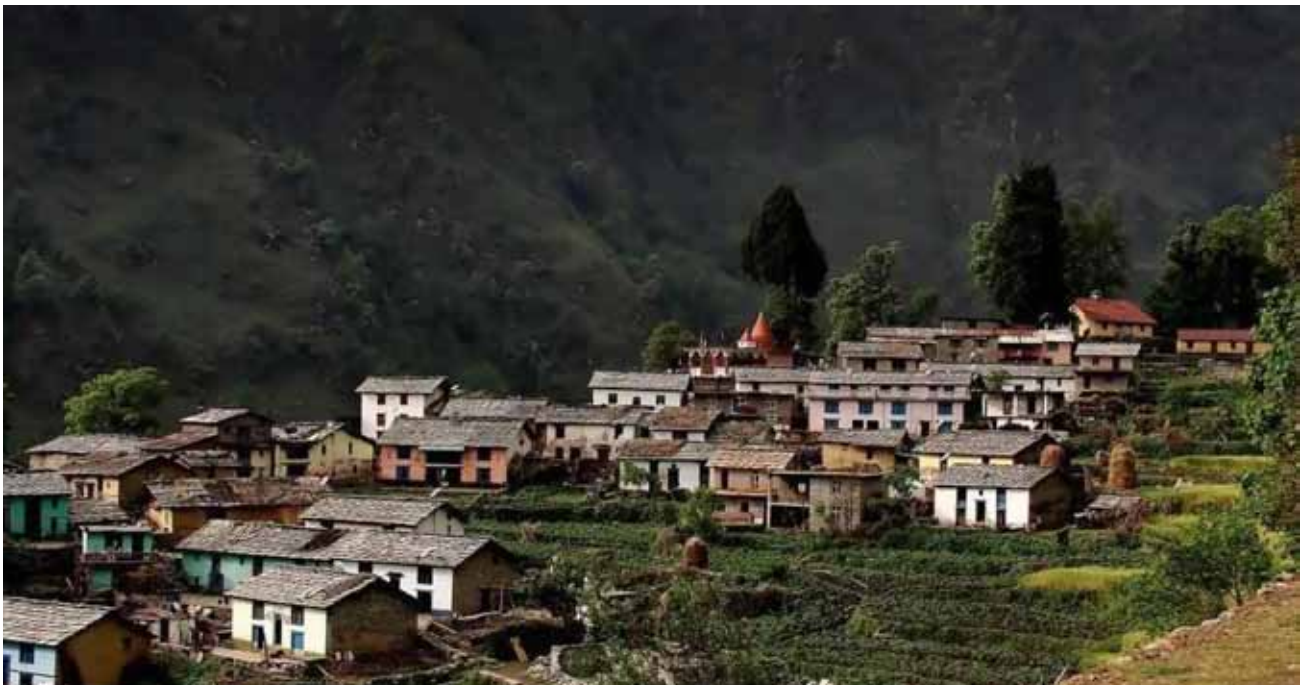
The farmers cannot progress without the provision for term loan. It enables them to shift to high yielding crop. Interest-free loans also enable farmers to switch to agricultural mechanization, which increases productivity.

Cluster-Based Approach

We are encouraging the farmers to adopt a cluster-based approach in order to ensure higher bargaining capacity and profitability. We have enabled the development of many agricultural clusters in the state for this purpose. Our experiment with ATG Silage has been highly successful.

We encouraged maize cultivation in 500 acres as part of the cluster development projects. Farmers are now witnessing multiple benefits of cluster farming. The results are so good that farmers are rushing to be part of it.

Most significantly, farmers are assured of buy-back facility by the government.





We have developed a commercial, economically viable animal husbandry sector. In livestock management, farmer aggregation has boosted growth. Cooperative societies formed by the farmers have led to multiple benefits which has led to increased prosperity

With the right intervention that offers multiple benefits, it is very easy to convince the farmers.

Globally, we are aware of the phenomenon of resistance to change. The most difficult thing to achieve is change in behaviour. But the farmers are not resistant to the changes that we suggest. They have realized that the changes that we are introducing are for their long term prosperity and development. These interventions made by the state government will make agriculture self-sustainable in the state.

Positive change can be driven by an individual. At the same time, we have realized the importance of creating and building institutions.

Organic Agriculture Act

Uttarakhand is the first state in the country to initiate this path-breaking move. Our efforts to promote organic agriculture are boosted by Paramparagat Krishi Vikas Yojana (PKVY) of the Central government to make major gains in this emerging sector.

Through the Organic Agriculture Act, the government has taken official steps towards giving a significant and strong boost to organic agriculture in the state. Currently, ten development areas in the state are engaged in organic agriculture. All these initiatives are happening through Paramparagat Krishi

Vikas Yojana boosted by the Centre.

Conventionally, organic agriculture has been followed in India for centuries. But that was by default, not by design.

Covid has brought us the realization of how important it is to eat healthy food and build immunity. Our effort is to revive this way of agriculture which is eco-friendly and health-friendly.

Select blocks shall be notified under the Act. There is no fear of productivity going down because we will ensure that our farmers use high quality organic inputs. In all, the state will have 40 clusters where organic agriculture shall be promoted.

Under this Act, the new act, NGOs, private entities, and traders engaged in the export market and processing of organic products will be regulated. The sale of chemical fertilizers will also be regulated and the act allows for penalties for banned substances. Fines for the usage of banned substances may reach up to Rs 1lakh.

Organic Agriculture Act will also help in simplifying the certification process. This shall facilitate the organic certification of agricultural products. The 'organic Uttarakhand brand' will receive encouragement.

Initiatives In The Animal Husbandry Sector

In the Animal Husbandry sector, we have many initiatives aimed towards the prosperity of the farmers and also breed improvement of the animals. The breed improvement programme is taking off in a big way because of the advancements in reproductive technologies like In Vitro Fertilization (IVF), embryo transfer process and artificial insemination (AI). Sex-sorted semen for cattle is another major initiative of the Government of India in which we have achieved major success in Uttarakhand.

BAKRAW brand and Uttara Fish – UK Initiatives

In most states, sheep and goats

UNIQUE STRENGTHS, AGRO-CLIMACTIC ZONES

In the fast track progress and development in Uttarakhand, agriculture and allied activities are playing a very major role. Sixty per cent of our population is engaged in agriculture and allied activities. The state's focus on these sectors in the last few years has enabled us to enhance the livelihood of farmers in a significant way.

Uttarakhand has combined terrain. We have mountain and plains also. This gives us unique strengths and also unique agro-climactic zones.

Existing programs of the state and also of the Central government are being utilized in order to achieve our goal of Atma Nirbhar Uttarakhand. We have a concrete road map for achieving these objectives.

There is strong focus on the development of diverse sectors of agriculture like millets, pulses, spices, honey production, mushroom production, herbal and aromatic plants etc. The small ruminants sector is very promising. We want to tap these strengths of the state.

Quality seeds and planting material has been provided to our farmers. We have focused on post harvest management so that our farmers do not have to face production losses. Cluster-based collective cooperative farming has been encouraged. This will significantly increase the bargaining power of farmers.



farmers because it is giving them major returns. Trout farming is also boosting agro-tourism in the state.

Tea Gardens

The agro climatic condition of Uttarakhand is unique and quite suitable for finest quality tea production both in flavour and productivity. The Uttarakhand Tea Development Board converted 218 ha of plantation into organic tea in Ghorakhal (Nainital), Champawat (Champawat) and Nauti (Chamoli). The organic tea produced here has been evaluated by tea tasters in Kolkata. The quality was found comparable to good quality tea gardens of Darjeeling district.

Tea cultivation in Uttarakhand has flourished with the earnest and rigorous efforts made by the state. The commercialization of this labour-intensive, eco-friendly industry has been possible through the active participation of villagers, small and marginal farmers. Tea has developed as a unique prolific cash crop model of its own in Uttarakhand.

We have to focus equally on the development of both the regions of the state – the hills and the plains. The objective of our initiatives in diverse sectors is to ensure farmer prosperity and development in both areas.

WE HAVE BEEN ABLE TO WIN THE TRUST OF OUR FARMERS

In order to usher in prosperity in the farming sector, we are enabling our farmers to flourish in diverse sectors of agriculture

We are constantly engaged in the efforts that can provide farmers of Uttarakhand wide exposure internationally. What are the best agricultural practices being followed around the world. What are the ways through which farmers are gaining prosperity globally. What are the good agricultural practices to maximize farmer income. We want our farmers to be familiar with all these progressive practices to ensure farmer prosperity and the nation's growth.

Over the last four and a half years, we have undertaken more than one hundred reforms in the agriculture sector. These include reforms in pre-harvest management, post harvest management, backward and forward linkages for farmers.

We are promoting organic farming among farmers. With the recent Covid pandemic, there is high realization among consumers regarding the merit of organic products. Consumers are ready to pay more for quality organic products.

In the pre-harvest management stage, earlier our farmers did not have access to farm machinery banks. We worked on this challenge and have achieved very good result. Productivity has increased by 14 per cent.

The other challenges faced by us in the farm sector are our small land-holdings, and a sizable percentage of small and marginal farmers. Along with mechanization, we are also focusing on high quality of seeds and high density planting material.

Our farmers do not have to worry about the availability of chemical fertilizers, when required. Our farmers can be sure of timely and prompt supply of the needed chemical fertilizers.

100 per cent of our farmers have been provided with soil health cards. These have proved to be highly useful in protecting soil health and avoiding the indiscriminate use of resources and fertilizers, insecticides and other farm inputs.

We have taken steps to provide quality planting materials to our farmers. Those engaged in organic cultivation shall be given certification for the same so that they can draw benefit in marketing their products.



Shri Subodh Uniyal
Agriculture Minister

Subsidy For Infrastructure Development

We are providing subsidy of 90 per cent on poly houses, 80 per cent subsidy for drip irrigation, 75 per cent for anti hail guns and 75 per cent subsidy for seeds. For the exemplary work done by us in the agriculture sector, we won the national award for 2017-18, and 2018-19. We shall definitely win the award for 2019-2020, which has not been announced yet.

For e-NAM, we have won awards for two years. We are multiplying the number of cold rooms provided to the farmers for post harvest management. A large number of cold rooms with 10 to 15 tonnes capacity are being provided so that people of an area can avail the facility.

Collection centers are being provided at Naib Panchayat level for farmers. Farmers are being given interest free loan of Rs 3 lakh at individual level and Rs 5 lakh at group level for upgradation of agricultural infrastructure.

The government is providing subsidy for high density plants plus poly houses. We have provided a very strong net of insurance to the farmers. Earlier the farmers' input in agriculture insurance was 2 per cent. For horticulture it was 5 per cent. The rest was paid by the Centre and the state government.

We are now implementing a highly ambitious agricultural project of IMA villages. These are Integrated Model Agriculture Villages. One such village will be set up in each district. This is a Government of India project to develop smart and model villages.

In order to strengthen the marketing facilities available for farmers, we are providing 1300 sale outlets all over the state, which are exclusively for farmers. Uttarakhand receives 7 crore tourists every year. Plus there is our domestic population which can buy from these sale points. Farmer and consumers, both shall be benefitted. On 430 outlets, work has started. Out of these, 20 will be mega outlets.

HIGH QUALITY APPLE PRODUCTION

In Uttarakhand, apple covers 25,785 hectares with an annual production of over 62,000 metric tonnes. The focus of the government's is on doubling apple cultivation area from 25,000 hectares. We have worked very hard at the quality of our apple production. Uttarakhand apples are now a very strong brand in the market.

The apples from Uttarakhand are as good as or even better than the apples of Kashmir. But there was a perception that the apples from Kashmir are better. So we opted for a value addition. We already have very good quality apples. In addition, we have good quality corrugated boxes to apple growers to ensure better fruit package. The buyers observed the difference. They appreciated the good quality of apples as well as better quality of packing. Because of excellent packing facilities, our apples remain fresh and crisp and have a long shelf life. The value addition helped tremendously, and our farmers have benefited in terms of higher sales.

It is important to spread awareness at grassroots level. We have made consistent efforts to make farmers aware of our farmer-friendly policies to ensure sustainable agriculture. We have constantly made efforts so that our farmers do not feel insecure in any way. As a result, our farmers work with higher focus and motivation. Higher mechanization, better marketing – all these are our areas of focus. These efforts are making our farmers prosper.

We have constantly made efforts so that our farmers do not feel insecure in any way. We have implemented a large number of projects which have led to increased farmer income and higher farmer confidence

In order to usher in prosperity in the farming sector, we are enabling our farmers to flourish in diverse sectors of agriculture. Hence clusters are being developed for honey production. There is focus on spices farming. Farmers are being encouraged to cultivate millets. Mushroom Vikas Yojana has been initiated to boost mushroom cultivation. The farming of medicinal and aromatic herbs is being promoted. Training is being provided so that our boys in villages can become entrepreneurs.

Integrated Models Of Agriculture, Development Of Clusters

We cannot discuss sustainable agriculture till we don't take up integrated agriculture projects and ensure their success at farmer level. 92 per cent farmers are small and marginal. They cannot depend on the crop sector alone. Our initiatives

in different sectors of agriculture have enabled our farmers to find new avenues for growth.

The middleman was always exploiting the farmers. As a result, the farmers did not get the right price for their produce and for their hard work. We have to focus on increasing farmer income. We have to work on increasing productivity. Integrated models of agriculture and development of clusters can help us achieve this.

We have initiated various such successful experiments in Uttarakhand. One of our successful projects is for the support of farmers who grow millets. As part of this project, we announced that the Mandi Parishad will buy millets directly from the farmers. As a result of this announcement, the rate of millets increased in the market and farmers were able to get better returns for their produce.

Farmers must always get the message that the government is friendly towards them. We are ensuring meaningful employment of our farmers. We are ensuring value additions for their produce. We are ensuring quality inputs for diverse agriculture and horticulture crops. We have implemented a large number of projects which have led to increased farmer income and also higher farmer confidence.

RAPID STRIDES IN INCREASING FARMER INCOME THROUGH LIVESTOCK SECTOR

The unique challenges faced by our dairy farmers can be attributed to the fact that an overwhelming segment of people involved in the dairy industry are marginal farmers and landless labourers. Dairy offers huge scope for farmer prosperity. This is why Uttarakhand has laid special emphasis on boosting the dairy industry in the state and achieving higher productivity. This has been possible with our initiatives in the field of breed improvement through Artificial Insemination (AI) and focus



on better animal feed.

In order to ensure the development of the dairy sector, we are equipping farmers with modern animal husbandry technologies and proper marketing facilities. Earlier, the state faced the challenge of low dairy production since a large number of animals were of nondescript breed with low yield. Farmers did not have access to veterinary services. AI services were poor and had a low success rate.

Breed Improvement

The breed improvement programme is taking off in a big way because of the advancements in reproductive technologies like In Vitro Fertilization (IVF), embryo transfer process and artificial insemination (AI). Out of these processes, IVF and AI have proven to be the most popular and effective methods.

The Nationwide Artificial Insemination Programme (NAIP) Phase-I was launched by Hon'ble Prime Minister Shri Narendra Modi in Mathura in September 2019. Every animal in the programme is being assigned a 12-digit unique identification number under the Pashu Aadhar scheme to ensure accuracy in tracking. The animal is monitored

Mrs Rekha Arya

Minister of W&CD, Fisheries,
Animal Husbandry and Dairy,
Uttarakhand





continuously from the period of AI till the birth of the calf. In keeping with its overarching objective, AI services are being delivered free at the doorstep of farmers.

In the past six years, the Animal Husbandry and Dairying sector has received a great deal of impetus under the Hon'ble Prime Minister's vision of Atmanirbhar Bharat. Developing rural farming with the latest innovations in technology will usher in unprecedented transformations in the state's dairy industry.

Cluster Based Trout Farming

Trout farming had observed slow pace of growth in the past. This was because trout growers were demotivated owing to various factors like capital intensive nature of trout farming, limited number of farmers, low momentum of production, absence of marketing linkages etc.

For development and establishment of trout farming as a primary occupation, upland areas of six districts were identified for trout farming. The state has achieved major success in the fisheries sector through focus on cluster-based trout farming through cooperatives.

Minimum of 20 farming units are

Uttarakhand is focused on increasing the number of farming raceways to 1200 by the end of 2024. With this, the state will roughly produce 1500 to 2000 MT of trout annually

established at one place. To achieve this, fisheries cooperatives have been formed in identified areas in mission mode, resulting in the existence of 28 fisheries cooperatives.

For financial support to cooperatives and thereby enhancing trout fisheries in the state, an integrated model has been developed which is funded through NCDC (National Cooperative Development Corporation). In this model, Farm to Table approach has been emphasized where 1000 trout raceways, hatcheries, retail outlets, OASIS (One Stop Aquaculture Shop & Information System) and market have been developed. Presently 300 MT trout production is being received which is being sold under brand name UTTARA FISH. The state intends to raise the trout production to near about 1000 MT

annually.

Through continuous, determined and consistent efforts of the department, 676 raceways have been created for trout farming works. The production from the state has reached around 148 tonnes. The state is focused on increasing the number of farming raceways to 1200 by the end of 2024. With this, the state will roughly produce 1500 to 2000 MT of trout annually.

Innovative Farming Techniques

The techniques where trout farming could be done in smaller land holdings is the need of the hour as land holdings available for farming activities is decreasing day by day. The ever increasing prices of land holdings also discourage availability of space for trout farming. Recirculatory aquaculture system (RAS) and biofloc represent a new and unique way to farm fish. These systems allow to rear fish at high densities in indoor tanks with a controlled environment. They also allow units to be established even where water supplies are small. Barren lands unsuitable for farming can also be utilized for commercial aquaculture through RAS and biofloc.

COOPERATIVE MOVEMENT IN UTTARAKHAND

TRANSFORMING THE RURAL ECONOMIES

Uttarakhand presents the success story of how cooperatives can play a significant role in agriculture and allied sectors for enhanced welfare of farmers. The state has developed commercially viable business plans and business activities based on the economic fundamentals of its rural heartlands

Uttarakhand is emerging as a highly progressive state with multi-disciplinary and focused approach towards rural development. This has been possible through the dedication and commitment of our people. Our efforts have been complemented by scientific research, innovations and technological advancements at all levels.

Rural migration and the challenges of mountain farming were emerging as demotivating factors for our farmers. They were also facing the challenges of low produce prices, poor irrigation, increased cost of cultivation, crop failure, etc.

With sustained efforts by the state, we have engaged the farmers in collective cooperative farming. This has been possible with the advent of the Uttarakhand Cooperative Development Project (UKCDP) in Uttarakhand, supported

The Uttarakhand government is focused on the development of the state through the cooperative sector

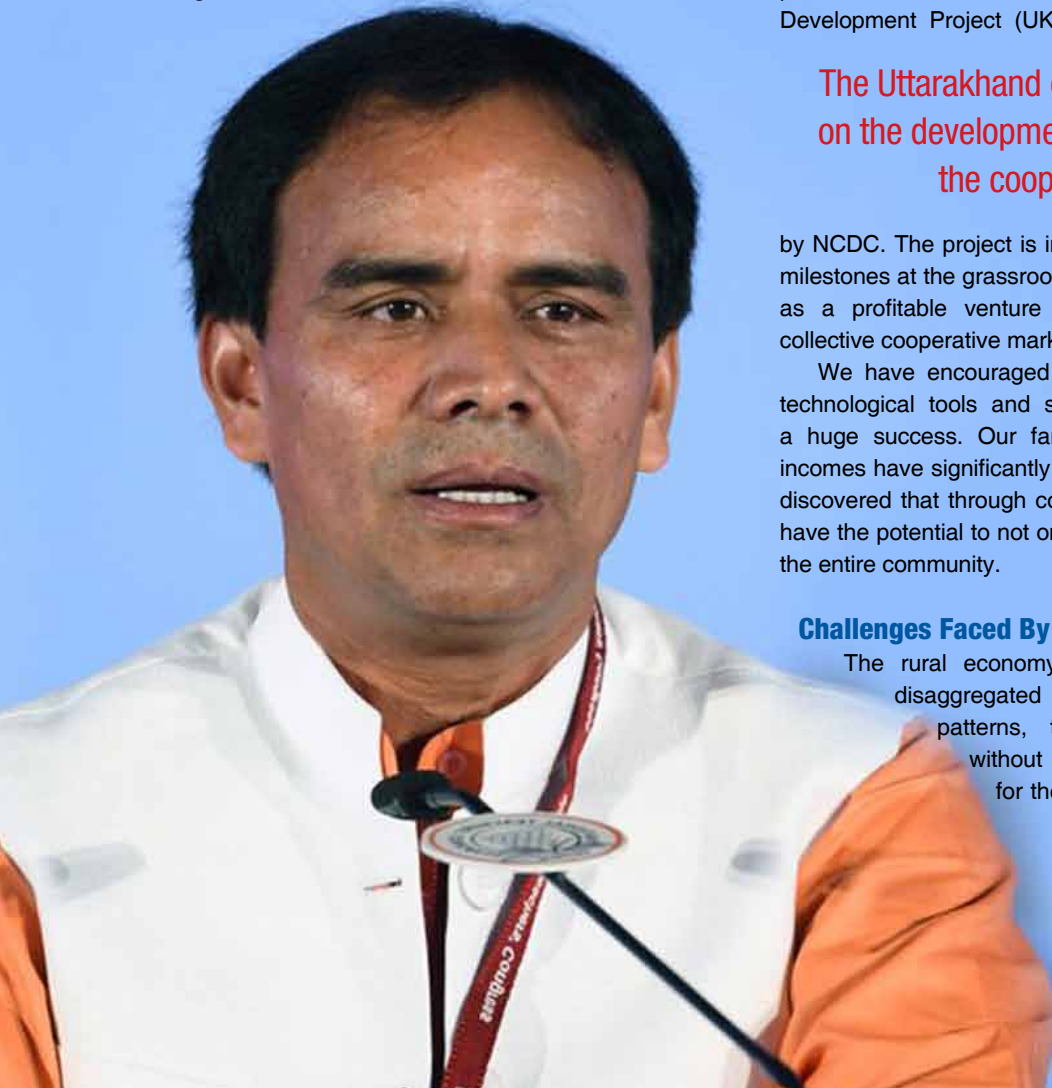
by NCDC. The project is in progress and is achieving many milestones at the grassroot level. Potato farming is emerging as a profitable venture using viable agri-practices and collective cooperative marketing.

We have encouraged our farmers to adopt innovative technological tools and systems. The initiative has been a huge success. Our farmers have witnessed that their incomes have significantly increased. Our farmers have also discovered that through collective cooperative farming, they have the potential to not only transform their own lives but of the entire community.

Challenges Faced By Uttarakhand

The rural economy in Uttarakhand is marked by disaggregated farming, marginal land holding patterns, traditional methods of farming without any access to organised markets for the farm products. The supply chain

Dr Dhan Singh Rawat
Uttarakhand Cooperatives Minister



logistics are either absent or not being utilised in the manner that's desired for effective transportation mechanism for the perishable farm products. The farmers resort to either subsistence farming or selling at local markets at extremely low prices.

Uttarakhand presents the success story of how cooperatives can play a significant role in agriculture and allied sectors for enhanced welfare of farmers. Development work through the cooperatives has started in many clusters already. The co-operatives in Uttarakhand have been made into Multi-Purpose Primary Societies. In order to utilize their potential to the fullest, the state government is developing these cooperative societies as the fulcrum of a large spectrum of legal business activities.

Uttarakhand has a three-tier cooperative structure with state federations at the apex, district central cooperatives at the district level, and primary agriculture cooperative at the bottom of the hierarchy.

The Uttarakhand government is focused on the development of the state through the cooperative sector. The Central Sector Integrated Scheme On Agricultural Cooperation (CSISAC) of National Cooperative Development Corporation (NCDC) is the major scheme through which this ambitious program is being executed.

The co-operatives through its three tier structures and the specialised co-operatives viz. sheep & goat, fisheries, dairy are being strengthened. These are further acting as the force multiplier towards increasing farmers' income.

The programme envisages to strengthen the apex state level institutions viz. Uttarakhand Co-operative Federation to play the catalytic role of enabling market access to the farm products of Uttarakhand.

Through this scheme, Uttarakhand has developed commercially viable business plans and business activities based on the local economic fundamentals of the rural economies of



We have encouraged our farmers to adopt innovative technological tools and systems. The initiative has been a huge success. Our farmers have witnessed that their incomes have significantly increased

the state. The funding support for the project is being covered by scheme support of national Co-operative Development Corporation (NCDC).

Collective Effort By Farmers

In March 2021, potato crop cultivation was introduced with the help of UKCDP under the Off Season Vegetables (OSV) value chain in District Bageshwar amongst 500 progressive farmers. 280 quintal potato seeds were made available to 347 farmers followed by dissemination of technical knowledge and marketing strategies.

The project emerged as a true testament to scientific achievement and collective effort by M-PAC farmers. After harvesting the crop, the team compared the crop cutting data with earlier records and found that the farmers obtained yield estimated to be a whopping 250 to 340

qtl /Ha, i.e. two-times higher productivity from the same pieces of land due to changes in crop variety and adopting new technology.

Garlic Production in Cooperative Cluster Model

In 2020-21, UKCDP decided to motivate the farmers to take up garlic production in the cooperative cluster model. The designated technical agency provided training to farmers on garlic cultivation. Although farmers had sown traditional seeds of garlic, technical advisory agency SUDHA delivered training on the package of practices for garlic crop.

Following the technical monitoring and interventions, farmers saw amazing changes in yield. Where the farmer was getting 70-80 kg of garlic from his plot, the production soared to 140-150 kg of garlic production from 1 nali plot. Total production was 100 quintal from the 4 gram panchyats of Almora district.

Higher Income For Farmers

Where farmers were getting Rs 30-40 per kg of garlic, they got Rs 70. This was a stupendous 75 % increase in their earnings! With the efforts of the project staff, the farmers also saved on the transportation charges. High profit has rekindled the interest of the farmers in garlic production.



FARMING SUCCESS

India's first Integrated Cooperative Development Project in Uttarakhand emerges as a major role model
Significant boost to rural economy by uplifting co-operative, farm and allied sectors



Dr R Meenakshi Sundaram

Secretary, Agriculture, Cooperative, Animal Husbandry, Fisheries; Chief Program Director, State Integrated Cooperative Development Project

Uttarakhand's Integrated Co-operative Development Project (ICDP), the first project of its kind in the country, has significantly improved the rural economy by giving a boost to the co-operative, farm and allied sectors.

Technical and financial support for the project has been provided by National Cooperative Development Cooperation (NCDC). The project, worth more than Rs 3,632 crore, has strengthened the rural economy by giving a boost to the cooperative, farm and allied sectors. This has helped the state to check forced migration from the hills.

About 50,000 small and marginal farmers have been directly benefited by the scheme. Through effective implementation of the project, the state has been able to create meaningful employment in rural areas. Additional avenues of employment have been created through commercial activities like marketing of agricultural produce and dairy products.

Uttarakhand's Integrated Co-operative Development Project has played a key role in implementing Prime Minister Narendra Modi's vision of doubling the farmers' income by 2022.



The project (ICDP) has consistently worked towards achieving a uniform economic growth in the state by bringing the farm sector at par with the manufacturing sector.

Through ICDP, the state has been able to benefit small and marginal farmers. Diverse segments of the Integrated Co-operative Development Project have helped to boost all aspects of the agriculture sector including the crop sector, horticulture, aromatic plants and cold water fisheries. It has given a boost to sectors such as animal husbandry, dairy, and has also uplifted the farmers engaged in the rearing of sheep and goats.

Challenges Faced By The State

The state faced many challenges in the agriculture sector. The following were the major challenges:

- Fragmented & small landholding of farmers
- Dominance of traditional crops cultivation
- Unavailability of quality inputs
- High post harvest losses due to insufficient or inaccessible value

Through Integrated Co-operative Development Project (ICDP), Uttarakhand has been able to give a boost to diverse segments of the agriculture sector

- chain services
- Largely rainfed agriculture, limited irrigation facility
- Lack of post harvest infrastructure
- Lack of primary & secondary processing
- High cost of transportation due to hilly terrain
- Limited Market Access & branding of state products

Through various initiatives in the cooperatives sector, Uttarakhand has been able to address these challenges in a phased manner. The initiatives undertaken by the state in the cooperatives sector include The Silage Federation, Apple Federation, Bakraw-UK goat meat, Anchal's Badri ghee and trout farming, to name a few.

These cooperative projects in

Uttarakhand are greatly benefiting the rural community. Along with work at ground level, the state government has also worked at long-term knowledge generation through these projects. The successful practices and models have been replicated across the agriculture sectors in an effort to consistently boost the incomes of the farmers.

Some Successful Agricultural Initiatives of Uttarakhand Marketing & Branding of BAKRAW –UK Goat Meat

This has been a highly successful initiative of the Uttarakhand government. The project has been implemented across four districts, five clusters and 29 primary cooperative societies.

The state provided the complete backward linkages to the farmers to enable them to take up goat rearing in an organized and efficient manner. Scientific training in goat rearing was provided to the farmers. The farmers were made aware of the right practices for health care, immunization and deworming for the goats.

Since marketing is a major challenge faced by farmers, the state developed the

BAKRAW brand to promote Himalayan goat meat. The state established the 'Meat On Wheels' marketing facility. These are specially developed vans with chilling and meat-cutting facilities that transport high quality goat meat to the buyers.

To provide further marketing support to the farmers, the state established linkages in the NCR region for the BAKRAW brand of goat meat from Uttarakhand. The Himalayan goat meat is now being exported to UAE. E-commerce platforms are also being tapped.

In order to ensure standardization, the state has established meat processing units. Other meat development activities are being taken up to develop BAKRAW as a strong brand from Uttarakhand. The concentrated efforts towards Uttarakhand's Himalayan Goat Meat Brand have increased the visibility of this brand of goat meat in national and international markets.

Uttarakhand Success in Horticulture

The state has moved from strength to strength in the field of horticulture. Uttarakhand has around 4.5 lakh farmers growing fruits, vegetables, flowers and other produce. The land covered by



Handholding is provided to farmers for all stages of production to certification and marketing. Farmers are also supported for post-harvest management including processing and packing

horticulture is about 2.96 lakh hectares, with business worth Rs 3,250 crore. The apples produced in Uttarakhand are now regarded as among the best in the market. Apple cultivation in the state covers 25,785 hectares with an annual production of over 62,000 metric tonnes.

Our major apple crop comes from Uttarkashi and Dehradun districts. More than 60 per cent of the fruit in Uttarakhand is produced in these areas. The state plans to develop apple cultivation zones in seven other districts - Nainital, Almora, Pithoragarh, Chamoli, Pauri, Tehri and Rudrapur.

The government wants to double the area under apple cultivation. The state is steadily moving farmers towards crop diversification in order to increase their income. Mushroom cultivation, trout farming, aromatic plants, medicinal herbs, off-season vegetables, pulses, spices – all these are areas of focus for the highly progressive, development-oriented Uttarakhand government.

Primary Fisheries Cooperative Societies: Major Boost To Fish Farming

The state decided to initiate trout farming



SILAGE FEDERATION

This is another successful initiative of the state, taken up as cooperative-cooperative partnership, cooperative-corporate partnership and collective cooperative farming.

The project was initiated to deal with the following challenges faced by those engaged in livestock farming:

- * Lack of fodder cultivation due to small land size
- * Farmers are ill-equipped for conservation of grass for lean months
- * Availability of fodder and grasses is dwindling both in quantity & quality
- * Present grass species in most of the Himalayan region has only 10-15% of original nutrient value
- * Concentrates are generally not fed to cows, bullocks, sheep and goat.

The project was initiated with the farmers engaged in collective cooperative farming of maize. The farmers were assured of buy-back. They were given training regarding Total Mixed Ration (TMR)/silage making. Tie-up with Anchal Dairy was provided.

Silage Federation has positively impacted the farmers in the state in a two-pronged manner. It has benefited maize farmers with higher remunerations. Also, the initiative has benefited dairy farmers with higher milk yields.



through cooperatives and develop trout clusters. Primary Fisheries Cooperative Societies (PFCS) were formed in selected hilly districts of the state. Now there are 28 PFCS in the state.

The state proposes to develop trout farming through Fisheries Cooperatives in six districts namely Uttarkashi, Tehri, Chamoli, Rudraprayag, Pithoragarh and Bageshwar. Trout farming clusters will be developed through societies.

Silage Federation has positively impacted the farmers in the state in a two-pronged manner. It has benefited maize farmers with higher remunerations. Also, the initiative has benefited dairy farmers with higher milk yields

One society of minimum members 11 will make 20 raceways. It is proposed to develop 50 clusters in the coming years.

With the focussed approach of the Department through various schemes like RKVY, Blue Revolution, Pradhan Mantri Matsya Sampada Yojana and NCDC, this sector has gained unprecedented success. Through continuous, determined and consistent efforts of the department, 676 raceways have been created for trout farming. Production from the state has reached around 148 tonnes. The state wants to increase the number of farming raceways to 1200 by the end of 2024. These will roughly produce 1500 to 2000MT of trout annually.

The number of trout farmers has increased significantly. Now more than 600 farmers are associated with trout farming. Marketing of trout and other Himalayan fishes is being done under brand name UTTARA FISH. The trout produced from Uttarakhand is supplied to big retail chains and major hotels.

Organic Farming

The total organic farming area in Uttarakhand has witnessed a 23% rise during the last three years. Out of the total agriculture area, 8% land was being used for organic farming in 2017. The figure went up to 21% in 2020. In 2017-18, a total of 585 clusters with 2,92,50 farmers were involved in organic farming on 11,700 hectares land. In 2020-21, organic farming was being done by 4.59 lakh farmers on 2.18 lakh hectare land.

We have promoted organic farming through dedicated schemes of the Government of India, namely the Paramparagat Krishi Vikas Yojana (PKVY). The scheme provides for end-to-end support to organic farmers. Handholding is provided to farmers for all stages of production to certification and marketing. Farmers are also supported for post-harvest management including processing and packing. In this way highly comprehensive support has been provided to organic farmers.

DEEN DAYAL UPADHYAY SAHKARITA KISAN KALYAN YOJANA



The government of Uttarakhand has launched a farmer welfare scheme named Deen Dayal Upadhyaya Kisan Kalyan Yojana for small and marginal farmers. Under this scheme, farmers of the state of Uttarakhand are given loans at low-interest rates. State farmers are given a loan of Rs 1 lakh at only 2% interest rate. Through this scheme, farmers of the hill state will be enabled to earn more income and also encouraged to do mixed farming.

Loan up to Rs 3 lakh is available on zero interest. The Uttarakhand

government has increased the interest-free loan amount from Rs 1 lakh to Rs 3 lakh as part of the Pandit Deen Dayal Upadhyaya Cooperative Farmers Welfare Scheme.

Small and marginal farmers are the biggest beneficiaries of this scheme. The interest-free loan amount of Rs 3 lakh is given through the cooperative banks. As part of this scheme, financial assistance has been provided to more than 3.50 lakh farmers. This is a cooperative farmer's welfare scheme.

Adarsh Krishi Gramin Yojana

Under the Pandit Deen Dayal Upadhyaya

Cooperative Farmers Welfare Scheme, the Adarsh Krishi Gramin Yojana has been started. The Yojana shall benefit more than 95 villages of 95 blocks. The central government as well as the state government have launched various schemes for the welfare of the farmers. The loan amount of Rs 3 lakh is given under the Kisan credit card, in which the loan amount of Rs 1.60 lakh is given to the beneficiary without guarantee. The farmers get the loan up to 3 lakh through the Kisan Credit Card (KCC). On the loan amount of Rs 1.60 lakh, farmers are not required to mortgage their land.

EMPOWERING RURAL WOMEN

Uttarakhand's Mukhyamantri Ghasyari Kalyan Yojna (MGKY)

Mukhyamantri Ghasyari Kalyan Yojna (MGKY) is an innovative initiative taken by the Uttarakhand Cooperative Development Programme, Department Of Cooperatives, Government of Uttarakhand. The purpose of the initiative is to empower the rural women of the state by reducing their burden of fodder collection and venturing into other income opportunities.

Uttarakhand's animal husbandry economy is immense, with livestock population currently at 47.94 lakhs. More than 70% of the state's population earns its livelihood from farming and livestock, etc., making it one of the main sources of income. Animal Husbandry in the hills is mostly undertaken by women, with 88% of the farming population believing that it is their burden to bear.

At present, more than 3 Lakh women in the hilly regions of Uttarakhand shoulder the responsibility of collecting fodder. The problem doesn't stop here. A study done in Almora reported that women engaged in collecting fodder experience extreme pain in their shoulders, upper back, lower back and knees. Women travel upto 8-10 hours on foot in search of fuel and fodder.

UKCDP is the pioneer behind the revolutionary policy that aims to relieve rural women from difficult circumstances of collecting fodder, avoid extremely heavy, unproductive workload, and accident-related grievances. The policy also aims to increase the availability of fodder by using scientific resources and tools to preserve crop remains and forage, reduce environmental pollution caused by burning forage, and increase the income of farmers by devising ways to improve health and milk producing abilities of cattle within the state.

RESPONDING TO RURAL CONCERNS

The Uttarakhand government has conducted eye-opening research into the issue of fodder collecting and its unwarranted burden on rural women. With Mukhyamantri Ghasyari Kalyan Yojna under effect, rural women will finally attain a new level of empowerment and control over their financial life. Not only that, this policy also aims to reduce their burden of carrying huge amounts of fodder, thereby reducing accidents and medical emergencies. The Department of Cooperatives has once again listened to the grievances of the people and formulated policy that is beneficial for all. The future of fodder, rural women and animal husbandry in Uttarakhand is bright and secure. Mukhyamantri Ghasyari Kalyan Yojna is a historically empowering policy in the making.



Easy access to silage and TMR

Under MGKY Policy Proposal, a rural woman's burden of collecting and carrying huge amounts of fodder for hours on end will be reduced drastically. This policy has increased the income of farmers and dairy providers. Easy access to silage and TMR saves time

Mukhyamantri Ghasyari Kalyan Yojna has increased the income of farmers and dairy providers. Easy access to silage and TMR saves time and opens more avenues to women to augment family income

and opens more avenues to women to augment family income.

All state farmer beneficiaries will avail silage/TMR/fodder block at subsidized rates. Approximately 2000 agricultural families and their 2000 acres of land will be cumulated to collectively grow maize. For the financial year 2021-2022, the goal is to attain 1,000 metric tonnes of production and fulfillment for Silage and TMR.

The state is providing subsidy to farmers on silage and TMR. The policy also provides for collective community maize farming, silage, TMR, and Hay Blocks and its establishment, production, marketing and distribution systems arrangements.

STATE AGRICULTURAL MARKETING BOARD, UTTARAKHAND INITIATIVES FOR DEVELOPMENT & FARMERS' WELFARE

The Uttarakhand State Agricultural Marketing Board and Agricultural Produce Market Committee was established to achieve the following purposes:

- * To ensure the welfare of farmers.
- * For effective regulation of marketing system of agricultural products.
- * For establishment and development of proper and modern market system for upliftment of agro processing and agricultural exports.

The Board and the committee deal with the development and welfare activities under the Uttarakhand Agricultural Produce Market (Development and Regulation) Act, 2011. Under the supervision of the State Agricultural Marketing Board, the APMCs have effectively implemented the agricultural marketing system. They ensure that a fair price to the farmer for his produce has to be provided by the trader. They also perform the following roles:

- * Prevent unauthorized deductions by the trader
- * Check the irregularities of measurement
- * Provide free weighing and storage facility
- * Information regarding market price
- * Resolving farmer-trader disputes
- * Implement farmer welfare schemes such as damaged crop compensation scheme
- * Provide accidental insurance

schemes

- * Provide scholarship scheme for students of agricultural faculty in the PG colleges

- * Provide subsidized agriculture produce carry boxes and saplings distribution to the farmers.

- * Purchase of hilly regions cereal crop such as mandua, jhingora etc. on MSP

- * Construction of connecting roads in villages, ropeways so that agricultural produce can be easily carried to the nearest market

- * Installation of hand pumps to ensure the drinking water on the way or in the village

- * Construction of collection centers, cold storage, warehouses so that agricultural produce can be stored for future sale in the market

- * Construction of market yard, sub market yard, farmer-consumer market so that farmer get opportunity to sell the agricultural produce near the farms.

- * Ensure that farmers are not exploited by the middlemen and they get a fair price for the produce.

The auction of the arrivals brought by the farmer to the mandi premises is done as per the guidelines of the committee so that the farmer gets a fair price for his produce. Till date more than 9388 lakh quintal of arrivals have been traded in the market yards of Uttarakhand. The APMCs have levied more than 1287 crore of fee from traders so that farmers welfare activities can be accomplished



Mr Vijay Prasad Thapliyal

DGM (Marketing), State Agricultural Marketing Board, Uttarakhand

through such funds in the notified market regions.

Facilities In Mandis

Market yards are constructed according to the requirement of the area so that along with the facility for selling the agricultural produce by the farmer, the business gets promoted and the economy get boosted. In this sequence, 28 mandis and 44 sub-mandis, 7 Apanu Bazar, 21 collection centers, 291 commercial and rural warehouses are available in the state.

In order to facilitate the farmers to bring their produce to the market yards, contact roads are constructed in the market area. More than 1238 km of contact roads have been constructed and 3953 hand pumps have been installed to provide drinking water to the farmers etc. Proper arrangements are made for rest houses, parking etc. for farmers in the market premises.

Free saplings are distributed to the farmers every year. More than 3,80,456 saplings have been distributed. Welfare schemes such as Scholarship Scheme, Farmer Producer Damage Assistance Scheme and Personal Accident Assistance Scheme are provided by the Marketing Board for the farmers and for the people involved in agricultural activities. More than 1866 scholarships, 388 personal accident claims and 481 crop compensation have been



Grading and testing laboratories have been set up in 16 mandis so that the agricultural produce can get the best price according to its category. Subsidized agricultural produce carry boxes are distributed to the farmers to make it easier for them to bring their produce to the market

E-National Agriculture Market Scheme is being implemented in 16 mandis of Uttarakhand, through which farmers sell their products through online trading

distributed.

Provision of contract farming, private mandi and e-trading have been made in the act, for the welfare of farmers.

E-NAM in Uttarakhand

E-National Agriculture Market Scheme is being implemented in 16 mandis of Uttarakhand, through which farmers sell their products through online trading. Till date 53984 farmers, 4706 traders, 2595 commission agents and 171 FPOs have been registered. Also, till date 26.25 lakh quintal produce worth of Rs. 329.71 crores have been traded online. Trade of 154001 lots and 118817 lots has been verified and more than 104 crore e-payments have been made to the farmers.

Under the grain purchase scheme from hill farmers, more than 4617 quintals of Mandwa, Jhingora etc. have been purchased at the MSP. Flower sales center, Banana ripening center, processing unit, etc. have been constructed under central government funded schemes. Daily price information for farmers has been made available on toll free number 18001024608. During the pandemic, the APMCs ensured the arrangement of fruits and vegetables at subsidized rates for the consumer in the area and the availability of food items was ensured in the notified region. Mandi fee and development cess are the main sources of income of the APMC.





UTTARA

THE UNIQUE FISHERIES INITIATIVE

Uttarakhand has immense scope for inland fisheries. The state is blessed with numerous resources suitable for fisheries. The state's fast flowing rivers and their tributaries, high and low altitude natural lakes, manmade reservoirs and numerous ponds are ideal for fish farming.

With over 15 important perennial glacier-fed rivers and over a dozen glaciers in the state, Uttarakhand is a valuable freshwater reserve. The state has 2686 km of rivers and canals, 0.20 lakh ha of reservoirs and 0.01 lakh ha of tanks and ponds. Carp-based freshwater aquaculture, mainly constituted by the Indian major carps such as, catla, rohu and mrigal contribute over 70 percent of the aquaculture production in the state. Exotic carps, pangasius and other fishes contribute 30 percent of total production.

The Department of Fisheries, Uttarakhand is continuously focussing on different sectors for the comprehensive development of aquafarming in the state. The department is planning and designing the schemes in a manner to maximise the sustainable usage of existing water resources. The thrust is on increasing productivity per unit area and developing new areas for aquafarming. Many initiatives have been taken by the department in hilly and plain areas to address the issues and challenges faced at ground level.

Cluster Based Trout Farming

Trout farming had observed slow pace of growth in the past. Trout growers were demotivated owing to various factors like capital intensive nature of trout



farming, limited number of farmers, low momentum of production, absence of marketing linkages etc.

For development and establishment of trout farming as a primary occupation, upland areas of six districts were identified. The state has achieved major success in the fisheries sector through focus on cluster-based trout farming through cooperatives.

Minimum of 20 farming units are

established at one place. To achieve this, fisheries cooperatives have been formed in identified areas in mission mode, resulting in the existence of 28 fisheries cooperatives.

For financial support to cooperatives and thereby enhancing trout fisheries in the state, an integrated model has been developed which is funded through NCDC (National Cooperative Development Corporation). Farm to Table approach

has been emphasized where 1000 trout raceways, hatcheries, retail outlets, OASIS (One Stop Aquaculture Shop & Information System) and market have been developed. Presently 300 MT trout production is being received which is being sold under brand name UTTARA FISH. The state intends to raise the trout production to near about 1000 MT annually.

Through continuous, determined and consistent efforts of the department, 676 raceways have been created for trout farming works. The production from the state has reached about 148 tonnes. The state is focused on increasing the number of farming raceways to 1200 by the end of 2024. With this, the state will roughly produce 1500 to 2000 MT of trout annually.

Innovative Farming Techniques

The techniques where trout farming could be done in smaller land holdings is the need of the hour as land holdings available for farming activities is decreasing day by day. The ever increasing prices of land holdings also discourage availability of space for trout farming. Recirculatory aquaculture system (RAS) and biofloc represent a new & unique way to farm fish. These systems allow to rear fish at high densities in indoor tanks with a controlled environment. They allow units to be established even where water supplies are small. Barren lands unsuitable for farming can be utilized for commercial aquaculture through RAS and biofloc.

Rejuvenation of Village Society Ponds

Many villages have ponds which can be used for aquafarming. Over the years, these ponds have been neglected and have got polluted. This is because waste water from whole village was discharged in them. Encroachment of these ponds for various reasons led to reduction in size.

Due to pollution, the productivity of these ponds has reduced drastically, resulting in low returns. For making

DEVELOPMENT OF ANGLING VILLAGES

The rivers are an important natural resource available in the state in abundance. These can be used for fish production and also for sport fishery.

Due to various natural and manmade reasons, natural fishery is depleting in rivers. Development of rivers without participation by local residents and active groups was a challenge. The department has identified major river systems which are divided in beats of five to eight kilometers. These are allotted to local groups/SHGs/Women groups for conservation and employment generation.

A total of 47 beats have been allocated till now. Allocation of beats has ensured a check on illegal fishing and conservation of fish in natural rivers. This has emerged as a source of employment for locals. A beat is generating direct employment for a cooperative (minimum 11 people) with an income of roughly Rs 1.60 lakh. Further development of beats as Angling Villages for supporting recreational fisheries will enhance income manifold by attracting tourists and anglers worldwide.

Through continuous, determined and consistent efforts of the Department of Fisheries, 676 raceways have been created for trout farming. The production from the state has reached 148 tonnes approximately

tonnes/hectare to more than 3.5 tonnes/hectare.

Reducing production cost, maximizing profit

For adoption of feed based culture, feed is provided to farmers at 50 per cent subsidy. Various other inputs items like nets, medicine, etc. are being provided at subsidized rate. For reducing the electricity expenditure incurred in fish culture, solar power support system technology has been initiated. Aquaculture is now considered at par with other agriculture activities in Uttarakhand. Availability of inputs has allowed regular monitoring and feed based culture, thereby resulting in better gains for the farmer.

village society ponds pollution free, a model of filtration tank, sedimentation tank with bypass channel, has been developed. Adoption of this technique has ensured the production of these ponds to be raised from a meagre two



DEVELOPMENT OF AROMATICS IN UTTARAKHAND FRAGRANCE OF PROSPERITY AND SUCCESS FOR FARMERS



Uttarakhand is blessed with a variety of soil types and varying agro-climatic conditions, ranging from sub-tropical to alpine. These zones are divided as alpine (above 3500 m), sub-alpine (2200-3500 m), temperate (1700-2200 m) and sub-tropical (350-1700 m above sea level). Further, these zones can be categorized as upper hills (alpine and sub-alpine), middle hills (temperate) and lower hills (sub-tropical) for agricultural point of view. These zones possess a rich and diverse variety of aromatic plant

resources and these diverse climatic conditions of the state are conducive for cultivation of various aromatic crops. Therefore, Uttarakhand Himalaya is well known for aromatics since ancient times and “Sanjivani” is most popular example used for treatment of unconsciousness of Lord Laxman.

Despite the fact that Uttarakhand has favorable environment for agriculture, farmers of Uttarakhand are not interested in cultivating agricultural crops. They face several problems such as continuous fragmentation of land holdings, far-off agriculture land from farmers houses,

high cost of agricultural inputs, damage of traditional crops by wild and domestic animals, high transportation cost of agri-horti produce, non-availability of agricultural labour, lack of processing facilities at farmer fields, rainfed cultivation etc. As a result, traditional agriculture has become un-economical.

Farmers have left agriculture and have migrated for better livelihood and employment opportunities. Also, environment and biodiversity, the rural economy of the state – all these have been affected adversely. The abandoned lands were threatened with problems like

soil erosion, loss of fertility, depletion of nutrients, less percolation of water in soil, drying of natural water resources and infestation of obnoxious exotic weeds like Lantana and Eupatorium etc.

Creation Of Aroma Enterprises

Keeping in view the problems of traditional hill agriculture and migration of people from rural areas of Uttarakhand, the aromatic sector has been evolved as a viable solution to revive agriculture and create employment opportunities in the villages. This is being done through creation and establishment of aroma enterprises. These include participatory consolidation of fragmented lands, trials, nursery, cultivation, processing, quality assessment and marketing of aromatic plants.

Efforts have been made to develop the aromatic sector in Uttarakhand as a major driver for upliftment of rural economy. To achieve this goal, CAP was conceived in 2003 at Selaqui, Dehradun. The core objective of CAP as an institution is to provide end to end facilities like Nursery Development, Cultivation, Extension, Research, Processing, Value addition, Quality Certification, Marketing etc. for all stakeholders of the aromatic sector.

To achieve all these objectives, CAP has established the Perfumery and Aroma Laboratories at CAP premises. It was inaugurated by Prime Minister Shri Narendra Modi on 4 December 2021. The benefits of research and development activities carried out at these labs will be made available to farmers, entrepreneurs, researcher, students, distillers, perfumers, associated industries, academia and

Benefits Of Aromatic Plants Cultivation

Considering the problems in traditional agriculture and other barriers, cultivation of aromatic crops seems to be a viable solution for raising the economy of the farmers of Uttarakhand. Aromatic crops are suitable for rainfed agriculture and can be grown successfully in stress and adverse conditions. These crops are generally safe from wild life and domestic animals. They are easy to transport due to conversion into essential oils of low volume. Value addition can be done in farmers' field. These can be stored for a long period as essential oils are non-perishable and have an organized market. There is also high demand for essential oils.

Keeping in view of the above, we have made efforts to create a complete business incubator centre for development of aromatic sector in Uttarakhand. The state has established an institute called Centre For Aromatic Plants (CAP). Here, all the required end to end facilities have been created and support services have been provided like survey, training, production of quality planting material, extension, distillation and marketing etc. These are made available to the farmers, entrepreneurs, researcher, buyers, distillers, perfumers and traders under one roof.



Dr Nirpendra K Chauhan
 Director, Centre For Aromatic Plants,
 Selaqui, Dehradun

research institutes etc. Extensive research work will be carried out in the field of production and value addition including crop improvement, biological activities, flavour and fragrance of aroma and perfumery sector etc. Nationwide, this is a unique intervention dedicated to extensive research for the aromatic and perfumery sector with a holistic approach.

Bhangajeera

A plant called Bhangajeera (*Perilla frutescens*) is largely found in Uttarakhand. It is rich in Omega fatty acid. The plant is well known for its extremely beneficial properties for the health of heart. After eight years of research, scientists at CAP developed a variety named 'Cafema'. After doing all the required testing, CAP obtained a US patent for this specific variety of Bhangira (Perilla) in 2020.

Support Services Provided To Farmers

Aromatic crop cultivation, processing and marketing are technical and business activities. These require a systematic scientific approach and a perfect business plan to achieve the goals. Presently, CAP is providing required

Considering the problems in traditional agriculture and other barriers, cultivation of aromatic crops seems to be a viable solution for raising the economy of the farmers of Uttarakhand

support services like agro-technologies, crop demonstrations, awareness & training, incentives to the farmers, quality planting material, buy-back of aromatic produce, networking of field distillation units, quality assessment for aromatic produce, marketing of essential oils and aromatic produce to the farmers and other stakeholders of the aromatic sector in Uttarakhand.

Services Under One Roof Provided By CAP

Adopting Cluster Approach

CAP has adopted a cluster approach for the development of aromatic crops as per the agro-climatic zones in Uttarakhand. In the cluster approach, 3-4 aromatic crops are selected to provide herbs for distillation units throughout the year. The harvesting calendar is drawn in such a manner that the crop has a different harvesting period. The distillation unit in a cluster should be established in a radius of 5-6 km to minimize losses due to transportation. Aroma cluster should have a group of at least five farmers. The cluster area should be not less than 2.5 hectares. This cluster approach was introduced in 2003 at Rajawala village, Dehradun. In this model cluster, 199 farmers have been engaged under aromatic cultivation and about 44.33 ha. area brought under cultivation. The major crops are Lemongrass, Chamomile, Basil, Japanese Mint, Citronella and Artemisia.

Incentives to Farmers

To promote farmers and entrepreneurs for cultivation, distillation and marketing of aromatic crops in Uttarakhand, CAP has framed the promotional schemes and policies.

Training & awareness: Free training in aromatic crop cultivation, distillation, marketing, quality assessment etc. is being provided to farmers and growers of Uttarakhand.

Cultivation: Providing free planting material to marginal farmers upto 5 nali; 50% area subsidy on cost of cultivation of nine aromatic crops upto a maximum of 1

Major Aromatic Crops Selected For Uttarakhand

Prior to large scale cultivation and extension of aromatic crops in the farmers' field, agronomic trials were carried out in various aromatic crops to study growth, yield and quality. On the basis of the results, the crops have been selected.

i. Lower hills - Lemongrass, Japanese Mint, Sandalwood, Palmarosa, Tagetes (patula), Citronella

ii. Middle hills - Damask Rose, Cinnamon, Chamomile, Tagetes (minuta), Geranium

iii. Upper hills - Damask Rose, Caraway, Costus

Cultivation of aromatic crops has been focused as bonus crop to generate additional income and maximum utilization of land from the existing cropping system. In these cropping systems, aromatic grasses are being promoted as waste land crops in abandoned lands; Damask Rose as boundary crop in apple, pea, rajma, potato and vegetable fields; Japanese Mint as inter-crop in wheat; Chamomile as short duration crop after paddy harvesting and Cinnamon as agro-forestry crop.

lakh or 2 hectares.

Processing & Distillation: 50-75% subsidy on field distillation unit (FDU) in aroma clusters of farmers' group.

Marketing support: Facilities for buy back for aromatic produce is provided to farmers for market assurance. Central Store Facility for storing essential oils of farmers has been created in CAP, Selaqui. Minimum support price for 25 cultivated crops and Himalayan minor essential oils is being provided by the centre.

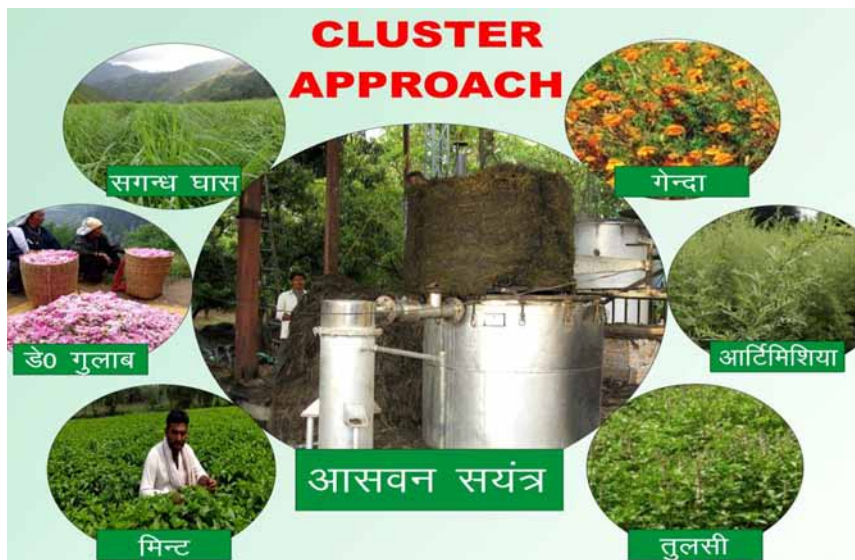
Quality assessment: Discount on testing of aromatic produce/essential oil is being provided to the registered farmers.

Registration of farmers: A system for registration of farmers for cultivation of aromatic crops in Uttarakhand has been introduced to simplify and facilitate the transit pass.

FDUs as agri-equipment: Field distillation unit declared as agriculture equipment and fabrication of FDU is free from SGST.

Marketing Support To Farmers

Lack of marketing and fluctuation in prices of essential oils is the major bottleneck in aromatic crop cultivation. Farmers have suffered a number of times due to marketing problems. To support farmers, growers and entrepreneurs,





minimum support price for 25 aromatic crops/essential oils has been fixed by the Government of Uttarakhand. This is being done in a manner so that farmers get remunerative price covering their actual cost of production and marginal profits. This facility helps farmers to avoid distress sale and keep their interest alive in aromatic crops.

Through all these services for extension of aromatic crops in a systematic and scientific manner, CAP has successfully developed and commercialized the aromatic sector in Uttarakhand. More than 21000 farmers have been engaged in cultivation, processing and marketing of aromatic crops, covering more than 7652 ha. area of land under cultivation. Aromatic crop cultivation in the state has been extended in a cluster approach and 109 aroma clusters have so far been developed. A total of 187 field distillation units are working in the farmer's fields. The overall turnover of the aromatic sector in the state has reached up to Rs. 85 crore per annum.

Strategy for Extension of Aromatic Crops

By adopting a systematic and scientific approach, CAP has successfully introduced and commercialized aromatic crops cultivation, processing and

The core objective of CAP as an institution is to provide end-to-end facilities like Nursery Development, Cultivation, Extension, Research, Processing, Value addition, Quality Certification, Marketing etc. for all stakeholders of the aromatic sector

marketing in Uttarakhand. The aromatic sector has emerged as an important sector for upliftment of rural economy and employment generation. CAP has successfully promoted the cultivation of aromatic crops in Uttarakhand. The major crops emerged are Damask Rose, Lemongrass, Japanese mint, Chamomile, Cinnamon, etc.

Rehabilitation Of Abandoned Land Through Cultivation, Distillation & Marketing Of Lemongrass

An initiative has been taken for the rehabilitation of abandoned lands through cultivation of Lemongrass. Earlier, these lands were left out by rural people due to several problems in hill agriculture and migration to urban areas for better livelihood and employment

opportunities. At present, Lemongrass is being cultivated by 4612 farmers in their abandoned lands, covering approx. 756 ha. The total production of lemongrass oil is about 576 Qt. per annum. Presently, 31 aroma clusters have been developed as Enterprise Business Model with the adoption of cultivation & processing of Lemongrass. Farmers are getting good return from these waste lands, which are higher than traditional crops like wheat, paddy, maize, madua, Jhingora etc.

Japanese Mint as Intercrop

Cultivation of Japanese mint is being promoted and these agronomical practices are successfully introduced in Tarai belt of Uttarakhand. Presently, it has been extended to 61 aroma clusters of Districts Udham Singh Nagar, Nainital, Haridwar and Dehradun. Nearly 6291 farmers are engaged in the cultivation of Japanese mint covering an area of 6118 ha. and approx. 5700 Qt. oil is being produced annually.

Damask Rose as Boundary Crop

The commercial cultivation of Damask rose as boundary crop was started in Joshimath cluster (Chamoli). It has now been extended to 39 aroma clusters of districts Chamoli, Dehradun, Rudraprayag, Bageshwar, Nainital, Champawat, Pithoragarh, Tehri Garhwal

FUTURE PLANS

Extension

- 13 Aroma Valleys in area of 29000 ha. benefiting 116000 farmers and providing employment to 145000 individuals
- Establishment of 2 regional centres for promotion of Aromatic crops (one in Kumaun and one in Garhwal)
- Promoting Commercial cultivation of US patented variety of Perilla
- Development of 13 Satellite Centres cum hi-tech nurseries in each district
- Promotion of Uttarakhand-specific aromatic plants

Research & Development

- Scaling up of CAP as specialized Institute of National Importance for Himalayan Region in Perfumery and Aromatics
- Development of higher yielding variety of local aromatic plants such as Gania grass, Ginger grass, Bhukambar, A. vulgaris etc
- Commercialization of Uttarakhand Himalayan Cinnamon Bark
- Bio prospecting and utilization of Himalayan minor essential oils in Aromatherapy, Nutraceuticals, Pharmaceuticals, Crops protection, Food & Beverages, Home & Personal Care, Fragrances and Flavours, Cosmetics and toiletries, Incense sticks, Herbal & Flavoured Tea, Tobacco & Paan Masala etc.
- Providing testing and certification services to perfumery and essential oils industries

Marketing

- Aroma park over 40 acres will be set up at SIIDCUL industrial estate, Kashipur
- Around 40 Perfumery and Aroma industries will be established
- Total investment of Rs 250 crore is expected in Aroma Park
- Direct employment for 1000 persons and indirect employment for 5000 persons will be generated
- The market of aromatic produce and essential oils will be available to the farmers within the state
- Revolving fund will be increased to Rs 10 crore for providing buy back facility to the farmers through Minimum Assurance Price

Human Resource and Entrepreneurship Development Programme

For Farmers, Students, Researchers, Entrepreneurs, Startups etc. in following areas:

- Cultivation of Aromatic Crops and Processing
- Quality Certification and Quality Control
- Fractionation of Essential Oil and Value Addition
- Perfumery and Blending
- Aromatherapy
- Ph.D programmes for Higher studies
- Product development (Perfume, Agarbatti, Deodorants, Soaps, Sanitizers, Hair Oil, Aroma Candles Flavoured Tea etc...)



and Udham Singh Nagar. Most of the farmers are growing damask rose in boundaries covering an area of 118 ha. More than 1249 farmers are engaged in Damask rose cultivation. The cultivation of Damask rose has to be highly profitable for tribal people and for improving their economy.

Farmers are getting 30-35 Q. flowers per hectare and earning on an average of Rs 3 lakh per hectare by selling rose flowers to local entrepreneurs who are making rose water or rose oil in each aroma clusters of Damask rose. Local farmer entrepreneurs are also being trained in marketing of rose water and they are selling rose water in standard packing on 'yatra routes' and pilgrims. Farmer entrepreneurs are getting oil yield of 0.75 kg from processing of 30 Q of flowers with a gross return of Rs. 4.5 lakh against expenditure of Rs. 3.85 lakh.

Cinnamon (Tejpat) as Agro-Forestry Crop

Cinnamon, naturally occurring in Uttarakhand is 'cinnamaldehyde type' because the chemistry of Uttarakhand cinnamon is similar to Cinnamon. This plant is a good soil binder and has good crop canopy, which helps in preventing soil erosion and environmental protection. Therefore, this crop has been selected for agro-forestry in Uttarakhand.

The cultivation of cinnamon is being carried out in the boundaries of the agricultural fields and abandoned lands. About 7246 farmers have been engaged under Cinnamon cultivation, covering an area of 461 ha. and nearly, 900 tonnes leaves being produced annually.

UTTARAKHAND

Best Horticulture State Award



NATIONAL COOPERATIVE DEVELOPMENT CORPORATION (NCDC) SUPPORTED UTTARAKHAND STATE COOPERATIVE DEVELOPMENT PROJECT (UKCDP)



UKCDP- Sheep Goat Sector

The Uttarakhand State Cooperative Development Project [UKCDP-Sheep Goat Sector] is accelerating the holistic development of the sheep and goat sector in Uttarakhand with the support of National Cooperative Development Corporation [NCDC]. Treading the path of success, we have established a state level Uttarakhand State Sheep Goat and Rabbit Farmers' Cooperative Federation Limited [USGCF]. We have also established more than 250 primary sheep goat cooperative societies at the village level, encompassing more than 10,000 sheep and goat farmers which includes 7,000 women member.

How we help our farmers

We facilitate multipronged assistance and guidance to our farmers. The members of the organized primary cooperative societies are provided with:

- High-quality sheep and goats for breed improvement and propagation of the stock.
- Timely Veterinary interventions for proper weight gain and growth of the progeny.

Traversing the Path from



Unorganized to Organised

We believe that small steps bring radical transformation and hence have initiated multiple arrangements and



Mr Anand AD Shukla
 Additional Registrar, UKCDP

reforms in the sphere.

- Surety of Sale: The federation enters into a “buy-back contract” with the sheep and goat farmers, under which the ownership of the produced progeny remains with the USGCF. This ensures a ready market for the farmers to sell their goats and sheep.

- Product Quality: With well monitored multi-level and multi-dimensional efforts, the goats thus reared provide hygienic and healthy meat.

- Creating Linkages: Persistently working towards creating a wider network of market linkages with prestigious hotels, academic institutions including LBSNAA Mussourie, colleges and consumers.

- Branding: The brand “BAKRAW- the Himalayan Goat Meat” has been conceived to sell the Himalayan goat meat through unique model of Meat on Wheels [MOW] and an e-commerce platform for easy access and wider reach. We have also entered into new territories in NCR Region in India and also abroad, supporting the ‘Vocal for Local’ spirit in the process.



Socio-economic Impact of the Project

The foundation of the project lies on a unique approach that positively impacts a multitude of stakeholders across the entire spectrum of the value chain- both socially and economically.

The dawn of the positive changes is evident in:

- Creation of sustainable livelihood opportunities in rural areas and opening of multi-field income avenues for the farmers with the provision of technical (veterinary services, insurance, improved breed etc.) and marketing support.
- The estimated projections of creation of Rs.1200 cr. of revenue, of which 70% is expected to reach the rural sheep goat farmers.
- Support to 10,000 sheep goat farmer beneficiaries and a large number of indirect beneficiaries such as logistic services providers, para vets, feed manufacturers and others.
- Enhancement of the nutritional security of the hill populace.
- Availability of safe and hygienic meat to the quality conscious urban



consumers in the state and outside the state.

Our Vision

To transform the unorganized sheep and goat sector of Uttarakhand into the self-sustaining organized cooperative sector, resulting in substantial

improvement in the livelihood of farmers making them 'ATMA NIRBHAR'.

Our Mission

Over 10,000 Sheep and Goat Farmers of Uttarakhand including 70% women are organised into Primary Sheep and Goat Societies under the roof of Uttarakhand Sheep Goat Rabbit Farmers' Cooperative Federation Limited [USGCF]. An economically viable unit of twenty females and one male of higher genetic potential are being established for each cooperative farmer member under this project supported by NCDC. This backward linkage will be supported by scientific sheep-goat rearing techniques, taking complete care of health, immunization, de-worming, feed supplement, insurance and supporting farmers' interest in line with Contractual Farming Act of Government of India. The value chain improvement will be bolstered by efficient marketing channels with the aim to provide quality conscious consumers in India and abroad with healthy, hygienic and high quality Himalayan Goat Meat via direct and e-commerce platforms.

BAKRAW

PREMIUM MUTTON BRAND FROM UTTARAKHAND



Dr Avinash Anand
 Program Director - Goat & Sheep



- Branding: The brand “BAKRAW” has been conceived to sell the Himalayan Goat Meat through Meat on Wheels [MOW] and an e-commerce platform for easy access and wider reach. We will soon enter new territories in India and abroad, also supporting the ‘Vocal for Local’ spirit in the process.
- Himalayan Goat Meat in India introduces a unique concept called Meat-On-Wheel to ensure best quality Machine cut, hygienically packed BAKRAW meat door delivery within 90 minutes of the order booked online, on-call and walk-ins, this concept also helps customers to get the products from their nearby locations as we have identified different locations for MOW.
- BAKRAW App has been introduced for both Android and IOS users for a better online order booking experience for the customers.
- To make BAKRAW and Uttara Fish (an initiative of Uttarakhand

Government for the upliftment of fish farmers) products easily accessible for its customers, BAKRAW-the Himalayan Goat Meat opened 3 highly equipped and air-conditioned Franchised Outlets in Dehradun City.

- To expand the reach of BAKRAW Products an agreement has been signed between Himalayan Goat Meat and Needs Supermarket, a reputed modern retails chain, for the sale of BAKRAW meat through 28 outlets in Delhi-NCR.
- BAKRAW meat is also being served in prestigious institutions like LBSNAA Mussourie, 7&5 Star Hotels, Restaurants and Govt. Institutions.
- BAKRAW brand has expanded its reach in the international market through Exports.
- Currently BAKRAW has 10,000+ Happy Customers.
- All these endeavors will contribute in improving the livelihood of the farmers of Uttarakhand state.



TWO SUCCESSFUL YEARS OF IMPORTED AUSTRALIAN MERINO SHEEP IN UTTARAKHAND

For breed improvement of sheep in the state of Uttarakhand, approval has been granted under the National Livestock Mission (NLM) by Government of India to Uttarakhand, Himachal and Jammu and Kashmir for 'Breed Improvement by Introduction of Exotic Sheep' scheme.

□ In the last week of December 2019, 240 (199 females and 41 males) of high-quality Australian Merino sheep have been imported and kept at the Govt. Sheep Breeding Farm, Kopadhar in District Tehri Garhwal.

□ Imported Merino sheep have successfully completed more than two year in the climate of Uttarakhand state and have given birth to 881 new offspring till date, out of which 135 are pure-line and 746 are cross-line.

□ The Merino sheep have gained 15 to 20 % of weight. The weight of male sheep has increased from 90 Kg to 105.5 Kg at Shama Liti Govt. Farm in District Bageshwar.

□ The average weight of lambs born is 3.5 to 5 kg. In just 03 months, the lambs have attained body weight up to 30 kg.

□ The mortality rate in imported sheep has also been very low, at less than 3 percent.

Wool Quality -

□ Imported sheep have given high quality wool through machine shearing in the month of May 2020:

Structured Breeding Program – Pure Line

□ 'Pure Line Structured Breeding Program' is being run as innovation by



rearing 8 Merino males and 199 Merino female sheep at Kopadhar Govt. Sheep Breeding Farm, Tehri Garhwal.

□ As of 14 February 2021, Kopadhar farm has obtained 135 highest quality Pure-line Merino lambs, with an average weight of 4.0-5.30 kg.

□ In the last 03 months, weight gain of 25 to 30 kg has been recorded in Pure line Merino Lambs.

□ The state presently has more than 360 Pure-line Merino sheep, more than 150 progeny are expected to be obtained in coming breeding season.

Cross-line

□ An innovative effort is being made to run 'Cross-line Structured Breeding Program' by using 27 imported Australian Merino males for breeding at 09 State Sheep Breeding Farms.

□ 746 Cross-line Merino Lambs of the highest quality have been obtained by natural insemination of 1159 breeding female sheep available in State Sheep Breeding Farms. The average weight of which ranges from 03 to 4.30 kg.

□ In the last 03 months, 20 to 25 kg of weight gain has been recorded in the Cross-line Merino Lambs.

Heat Synchronization and Artificial Insemination

□ Under the National Livestock Mission (NLM) scheme, Artificial Insemination of more than 1400 sheep of local herders has been performed by collecting semen of high genetic value from imported Merino males.

□ The Merino males born will be distributed to the sheep herders of the state in future and it is proposed to improve breed and wool quality by running natural insemination and artificial insemination programs at a rapid pace.

Avg. Diameter	Avg. Length	Avg. Medullation	Avg. Clean Wool Yield %	Avg. Exp. Annual Yield
16.88 micron	Up to 4 – 5 cm (for 05 months wool)	0%	78.34	05-06 kg

SILK INDUSTRY FOR HAPPINESS & PROSPERITY



Uttarakhand is located in the southern slope of the Himalaya. The state is bestowed with sub-tropical as well as tropical climates demarcated by high hilly terrains, deep gorges to plains of tarai regions. The climatic conditions of Uttarakhand are well suited for the development of different types of silk i.e. Mulberry, Eri, Tasar & Muga silk.

The plain and valley regions of district Dehradun, Hardwar, Nainital and U.S. Nagar are more suitable for production of mulberry silk. Hilly districts are suitable for Oak-Tasar silk production. Owing to international quality of bi-voltine silk produced by the state, Uttarakhand is also well known as 'Bowl of Bi-voltine Silk'.

A Successful Sector

Sericulture plays an important role in providing part time livelihood to economically downtrodden sections of the society in the state. Sericulture industry is very helpful for the economy of hill states like Uttarakhand. The main attractive factors of this industry are as follows.

- Its high rural employment potential for all age groups
- Low investment and high returns
- Transfer of income from high-income groups to low income groups
- Arrests migration of landless agricultural labour and farmers to urban areas
- Its economics is superior to cash crops and returns are in quick succession
- High export potential
- Eco- friendly



Dr AK Yadav
 Program Director, Sericulture

Oak Tasar Project

Considering the immense potential for commercial production of oak tasar silk in the state, an Oak Tasar Project has been launched in Uttarakhand by Central Silk Board, Ministry of Textiles, GOI under a Central Sector Scheme. The project is continued up to 2021-22.

The project is being implemented by the Department of Sericulture, Uttarakhand in Chakrata Block of Dehradun, Joshimath Block of Chamoli, Munsiyari Block of Pithoragarh & Kapkot Block of Bageshwar through four NGOs, namely AT India, HIFEED, SANJEEVANI & SUVIDHA.

Objectives

- To create Oak Tasar production base for employment generation to tribal hill folks
- Stabilization of seed crop and creation of infrastructure for seed development

- Exploitation of oak flora for income generation through technology dissemination

Key features

- Total outlay of the project is Rs. 2836.51 lakh
- Thirty Manipuri banj kissan nurseries will be raised for supply of saplings
- Total 500 hectares of Manipuri banj plantation will be raised through 500 plant growers
- Selection of 250 seed cocoon rearers for silkworm seed Cocoon production
- Production of Commercial oak tasar cocoons by 1300 rearers
- Establishment of 30 private graineurs (Seed producers) for production of silkworm seed
- 10 disinfection agents selected for door to door disinfection work
- Under post cocoon sector, 50 reelers will be trained and will be provided reeling machines
- 100 spinners will be developed and spinning machines will be installed
- Under infrastructure sector
- Two basic seed production units
- Three cocoon preservation units
- Ten Chawki rearing centers
- 450 rearing sheds to the rearers
- One cold storage has established during the project period
- Total 2290 families are directly benefitted under the project
- Approximately 5000 beneficiaries will be indirectly benefitted through the project
- At the end of Project total 3.6 M.T. Raw Silk & 1.7 M.T. Spun Silk will be produced

UKCDP SHEEP GOAT SECTOR

REGULAR INCOME, HAPPY FARMERS



The Uttarakhand Integrated Cooperative Development Project UKCDP's Sheep Goat Sector has been developed with the support of National Cooperative Development Corporation [NCDC].

The state-level Uttarakhand Sheep Goat and Rabbit Farmers Cooperative Federation Limited [USGCF] has been established. Many primary cooperative societies have been created at village level encompassing more than 10,000 sheep and goat farmers. These include about 7,000 all women primary cooperative societies (PCS).

The initiative is providing multi-pronged assistance to farmers. Members of the PCS are provided with high-quality sheep and goats for breed improvement and propagation of the stock. Timely veterinary interventions are provided for the animals.

The initiative has moved sheep and goat rearing from the unorganized sector into the organized sector. USGCF has initiated multiple reforms in the sector.

- **Surety of Sale:** The federation has entered into a buy-back contract with the sheep and goat farmers. Ownership of the produced progeny remains with the Uttarakhand State Sheep, Goat, Rabbit Cooperative Federation Ltd. This ensures

As part of the project, many primary cooperative societies have been created at village level encompassing more than 10,000 sheep and goat farmers. These include about 7,000 all women primary cooperative societies.

a ready market for the farmers to sell their goats and sheep.

- **Product Quality:** With well monitored multi level and multi dimensional efforts, the goats thus reared provide hygienic and healthy meat.

- **Creating Linkages:** Persistently working towards creating a wider network of market linkages with defence organisations, institutions, colleges and consumers.

- **Branding:** The brand 'BAKRAW' has been conceived to sell the Himalayan goat meat through Meat on Wheels [MOW]. An e-commerce platform has been provided for easy access and wider reach. Soon, the produce will marketed in new territories in India and abroad.

Meal On Wheel

USGCF has introduced a unique concept called Meat-On-Wheel to ensure best quality machine cut, hygienically packed BAKRAW meat door delivery within 90 minutes of the order booked online, on-call and walk-ins. This concept also helps

customers to get the products from their nearby locations. Diverse locations have been identified for MOW. The BAKRAW App has been introduced for both Android and IOS users for a better online order booking experience.

To make BAKRAW and Uttara Fish products easily accessible, three well-equipped and air-conditioned franchised outlets have been opened in Dehradun.

To expand the reach of BAKRAW products, an agreement has been signed between Himalayan Goat Meat and Needs Supermarket, a reputed modern retails chain for the sale of BAKARAW meat through 28 outlets in Delhi-NCR. BAKRAW brand has expanded its reach in the international market through exports. All these endeavors will contribute in improving the livelihood of the farmers of Uttarakhand state.

The BAKRAW initiative is the story of the transformation of the unorganized sheep and goat sector of Uttarakhand into the self-sustaining organized cooperative sector.

UKCDP'S ENDEAVOR IN TRANSFORMING FARMING SECTOR POTATO FARMERS FIND AFFLUENCE THROUGH UKCDP INITIATIVE



India has made an indelible mark in the global economy as a leading agricultural nation, with the tremendous advancement in food production as a result of scientific research, innovations and technological advancements. However, studies conducted at the grassroots level have indicated that a significant portion of Indian farmers is quitting agriculture. This is largely due to low produce prices, poor irrigation, increased cost of cultivation, crop failure, etc. By adopting innovative technological tools and systems, these

farmers have the potential to not only transform their own lives but that of others too.

This has been possible with the advent of the Uttarakhand Cooperative Development Project (UKCDP) in Uttarakhand, supported by NCDC. Under the guidance of Cooperatives Minister Mr Dhan Singh Rawat and the hard work of visionary Secretary cooperatives Dr R Meenakshi Sundaram, IAS, the project is in progress and is achieving many milestones at the grassroot level.

With the Start of the UKCDP project in

Uttarakhand, potato farming is emerging as a profitable venture using viable agri-practices and collective cooperative marketing.

With the initiation of the project in Bageshwar district since October 2020-21, M-PACs farmers have experienced substantial changes. With the facilitation and technical support of SUDHA, which is working as a Techno-Management Support Agency under the project, the M-PACs farmers are being continuously motivated towards viable agri-practices of farming to achieve optimum productivity.



Project Successfully Addressed Farmer Concerns

In March 2021, potato crop cultivation was introduced with the help of UKCDP under the OSV value chain in District Bageshwar amongst 500 progressive farmers. 280 quintal potato seeds were made available to 347 farmers followed by dissemination of technical knowledge and marketing strategies.

Earlier, where farmers were sowing traditional varieties of seeds and getting less productivity due to crop disease, insect/rodent infestation etc. They continued usage of the same variety, leading to crop failure. Now they were being actively mobilized and encouraged to adopt newer variety of seeds while being facilitated with innovative practices/ techniques to increase crop yield.

Some key inhibitors of agro-entrepreneurial and farmers' growth were the problems of identifying profitable markets, lack of proper irrigation and crop scheduling practices. The project successfully addresses these concerns and created sustainable solutions that provided great economical relief to our M-PACs farmers.

For large-scale potato cultivation with selected farmers, the Agronomists/

Experts of the organization took the opportunity to train the farmers in selecting ideal seed tubers and acquainted them with the purity of the cultivars. The farmers were trained about all the pros and cons to be considered while cultivating, including land ploughing, weed elimination, crop rotation, and so forth. At the end of the project, crop cutting data was recorded randomly from these cultivated areas.

High Quality Bumper Crop

The project emerged as a true testament to scientific achievement and collective efforts by M-PAC farmers. After harvesting the crop, the team compared the crop cutting data with earlier records and found that the farmers obtained yield estimated to be a whopping 250 to 340 qtl /Ha, i.e. two-times higher productivity from the same pieces of land due to changes in crop variety and adopting new technology.

The production from the activity was sold to local markets of Kapkot, Bageshwar, and also supplied to Haldwani mandi. The farmers mobilized to sell their production collectively for lucrative returns and a significantly lower cost of transportation. Earlier, where

the farmers were selling their produce individually and receiving little to no profit, now the same farmers sold their potato yield collectively and received greater value for the product than ever before.

Most importantly, the farmers learned the crucial lesson of considering farming not just in terms of economic and monetary benefits alone, but also envision it as a sustainable way for the future generation.

Under the enlightening supervision, monitoring, and guidance of Secretary Cooperatives Dr R Meenakshi Sundaram, IAS and the hard work of the Project Authorities of UKCDP, the project has emerged as a huge success. The unremitting facilitation and timely advice imparted to the farmers regarding accurate nutrition, irrigation, crop health etc has helped them tremendously. The once-struggling farmers were able to attain improved productivity, which in turn led to increased incomes and profitability from the OSV value chain. The livelihoods of the M-PAC farmers have changed exponentially owing to the successful endeavours by the project authorities at UKCDP.

PANTNAGAR UNIVERSITY: AN INSTITUTION OF NATIONAL PRIDE



Govind Ballabh Pant University of Agriculture and Technology (GBPUAT) is a state agriculture university with national character. It is not only serving the people of Uttarakhand but also immensely contributing to the development of Indian agriculture. Many crop varieties and agricultural technologies developed by Pantnagar have outpaced local varieties and technologies.

Nation Builder

Over the last 60 years, Govind Ballabh Pant University has made significant contributions in the development of the agriculture sector in the country. It played a major role in ushering Green Revolution. The integrated model of agricultural research, teaching and extension developed and tested at Pantnagar was adopted across the country in more than 70 agricultural



Dr Tej Partap Singh

Vice Chancellor, GBPUAT, Pantnagar

universities.

Invigorated Rice Production

The scientists of this centre of excellence solved a major problem in rice production by finding a remedy for the Khaira disease. For his award winning research on Khaira disease and for invigorated rice production in India,

Dr YL Nene was bestowed with coveted "International Rice Year 1966 Prize" by the Food and Agriculture Organization of the United Nations.

Pulse Revolution in India

The pulse programme of Pant University is considered as one of the best in India. It has developed more than 70 high yielding varieties of Urd, Moong, Arhar, Gram, Pea and lentil, which have been widely adopted in Uttarakhand and rest of India. In many cases the government indent of even single Pant varieties goes upto 15-18%.

Pantnagar Seeds: The Trusted Brand

Pantnagar Seed has been the most trusted seed brand of India. The university produces approximately 7500 quintal breeder grades seed, which is sown by farmers over millions of hectares land every year. The university established Tarai

Development Corporation in the year 1969 in association with Government of India and Farmers of Tarai region. It was renamed as Uttaranchal Seeds and Tarai Development Corporation Ltd. (UAS & TDC) in the year 2003. The government of India and World Bank treated TDC as a role model for developing many seed ventures across the country under National Seed program (NSP). TDC played a crucial role in Green Revolution in India by providing quality seeds to farmers at affordable rates. The university is also providing quality seeds to more than 300 seed companies located in Uttarakhand.

The university has also played a crucial role in enhancing the productivity of different agricultural crops across the country.

Natural Resources Management: A basis of sustainable development

The university has developed micro irrigation, fertigation and mulching led improved production technology for the cultivation of fruit crops (mango, litchi, guava, papaya), vegetable crops (potato, cauliflower, cabbage, broccoli, summer squash, tomato), cut flowers (gladiolus, lillium), and agronomical crops (rice and wheat) for Uttarakhand. These have resulted in water saving up to 80% and yield increase by 40-100%. The scientists of Pantnagar have benchmarked drip irrigation system for hilly terraces, which has been included in the "Operational Guidelines of Per Drop More Crop (Micro Irrigation) component of PMKSY 2017 and 2021. Scientists are rigorously working on introduction of direct seeded rice technologies in Uttarakhand to conserve resources and decrease input cost. Thousands of acres in Tarai region of Uttarakhand has been converted under direct seeded rice cultivation.

The university has been a pioneer in developing resource conservation implements. The zero-till-ferti-seed-drill developed at Pantnagar has been considered as the highest used agri-technology in Indo-Gangetic plains.



Honourable Governor of Uttarakhand honouring KB Chiya founders

The integrated model of agricultural research, teaching and extension developed and tested at Pantnagar has been adopted across the country in more than 70 agricultural universities

Second Milk Revolution On Anvil

Livestock management is an important component for enhancing farmers' income. The university has given equal importance to livestock management through its leading research programme AICRP-Cattle-Frieswal (FPT). Dr Chandra Bhaan Singh, a leading scientist of Veterinary Science states that the project is running since 2010 in 344 villages linked with eight Artificial Inseminator Centres of U. S. Nagar & Nainital districts of Uttarakhand. Breed improvement programme has been undertaken at massive scale.

Converting Research Output into Intellectual Properties

Pantnagar University is working hard to convert research output in intellectual property by encouraging scientists for filling patents. The university put in place an organized structure of patenting in the year 2015, which resulted in filling a record number of 143 applications. Some of the important patents granted to the university's scientists are: Animal

driven Zero-Till-Ferti-Seed Drill, Vaccine for Protection of Poultry Birds against Salmonellosis, Bacterial Consortium for degradation of low density and high density polythene, consortium for degradation of electronic items, subsoiler-cum-differential rate fertilizer applicator, PCR based pre-assessment of rice blast disease. The impressive progress of Pant University in patenting was applauded in Rajya Sabha in the year 2019 by the then Minister of Science and Technology Dr Harsh Vardhan.

Rural Entrepreneurship and Start-Ups

Pantnagar University has played a key role in generating rural employment through specialized trainings and transfer of technologies. Several thousands of rural youths have been mentored and guided for establishing rural entrepreneurs. The university has created a structured ecosystem for Start-ups and rural entrepreneurship. It is acting a nodal agency of Start-up Uttarakhand. Three Start-ups established by University namely K.B Chiya, Shunya India Pvt Ltd and Herba Star Enterprise, respectively engaged with Gherats (water-driven flour mills), value added natural products (medicinal plants) and mushroom production (year-round) have been applauded by honourable Governor of Uttarakhand Lt General Gurmeet Singh (Retd).

Uttarakhand Agriculture

ROBUST PROGRESS

Located at the foothills of the Himalayan mountain ranges, Uttarakhand is abundantly rich in natural resources especially water and forests with many glaciers, rivers, dense forests and snow-clad mountain peaks. Blessed with rare bio-diversity, the hilly state has almost all major climatic zones, making it amenable to a variety of commercial opportunities in horticulture, floriculture and agriculture.

Most of the area in the state comes under forests and wastelands. Only in about 14% of land out of the total reported area of 56.72 lakh ha, agriculture is practised. Out of the total cultivated area, 89% comes under small and marginal holdings.

Agriculture is a predominant sector in the state economy which contributes around 23.4% in State Domestic Product (GDP). The average size of land holding in the state is 0.95 ha as against the

National Average of 1.57 ha. The agriculture sector in the state continues to remain heavily dependent on rainfall.

Despite the immense pressure on the agriculture sector due to limited resources and difficult terrains of the state, the sector is registering phenomenal progress. The total food grain production in the state was 18.75 lakh metric tonnes in the year 2016-17, which has increased to 20.03 lakh metric tonnes in the year 2020-21 registering an increase of 6.83 percent in the production of food grains.

Powered by visionary policies, the state is carving a niche for itself in agricultural domain

E-NAM –Trading across state boundaries

Electronic National Agricultural Market (e-NAM) has been operational in the

state since 2017. The regional farmers, because of this scheme are enjoying the benefits of selling their agricultural produce through e-NAM portal to various traders at the state and inter-state level, helping them to make a choice of selling their products at their own terms. In the first phase, in the year 2017, E-NAM scheme was launched in five mandis - Haridwar, Kashipur, Kichha, Sitarangaj, Gadarpur and the number has went up since then. Presently e-NAM scheme is operating in 16 mandis of the state.

Internet lease line, computerized entry slip, assay laboratory, auction room etc., are the facilities available in each e-NAM mandi. A total of 53976 farmers, 4702 traders and 2595 commission agents have been registered on e-NAM portal till date. A praise worthy achievement of trading 26.15 lakh quintals of agricultural produce worth Rs 328 crore has been achieved under this scheme. Under e-NAM, 19062





e-payments worth Rs. 104.25 crores has been made. Unified licenses are being issued free of cost to the market traders for inter-state trade. Till date, a total of 4702 traders have been issued Unified License.

IMA - Popularising Cluster Based Integrated Farming Method

Integrated Model Agriculture Village Scheme (IMA) introduced during 2020-21 would be operated by farmer groups on cooperative basis by adopting cluster based integrated farming method. This is expected to increase employment opportunities. Every year 95 Gram Sabha/Grampanchayat/Cluster will be selected from the development blocks of the state. Under the Scheme, the selection of the village/cluster will be done by a committee constituted under the chairmanship of the District Magistrate. A cluster will be formed consisting of a village or its adjoining other villages of similar climate. The area of the cluster will be determined according to the agricultural land available in the village, but it is necessary to have a minimum area of 10 hectares in a cluster. About 100 farmers will be covered in the selected village/cluster. Dairy, Goat rearing, Poultry, Bee keeping, Mushroom production, Seed production, Flower production, Vegetable production etc. will be selected by the village/cluster keeping in view the local situation, climate and transportation etc. Funds will be provided in the form of revolving

Production and Productivity of Cereals, Pulses, Foodgrains and Oilseeds in Uttarakhand.

Production: Lakh Metric Tonnes

Year	2016-17	2017-18	2018-19	2019-20	2020-21*
Foodgrains	18.75	19.21	18.60	18.92	20.03
Oilseeds	0.27	0.26	0.23	0.23	0.25

Average Yield: Qtls./ha.

Year	2016-17	2017-18	2018-19	2019-20	2020-21*
Foodgrains	21.60	22.80	22.83	23.45	24.74
Oilseeds	9.64	9.47	9.38	9.68	9.54

*Provisional Data

The total food grain production in the state was 18.75 lakh metric tonnes in the year 2016-17, which has increased to 20.03 lakh metric tonnes in the year 2020-21 registering an increase of 6.83 percent in the production of food grains.

Organic Agriculture- Producing safe and economical food

Uttarakhand Legislative Assembly in 2020 passed "THE UTTARAKHAND ORGANIC AGRICULTURE ACT, India's First Act in the field of Organic Agriculture. Under this act sale of chemical fertilizers, pesticides etc., shall be regulated in the notified area (10 Blocks namely- Dunda, Pratapnagar, Jaihari khal, Jakholi, Augustmuni, Ukhimath, Dewal, Salt, Betalghat, Munsyari).

Presently Department of Agriculture of Uttarakhand is promoting organic farming among the farmers through two major programs i.e. PGS standard certification through PKVY and Third Party certification program as per NPOP & NOP standard through RKVY support. Since year 2016 when first phase of PGS launched in the state under PKVY scheme, there were more than 10 local organic outlets operated by the farmer/farmer groups in different locations of the state. After successful implementation of the outlets and satisfaction of the farmers

fund/seed money, subject to a maximum of Rs.15.00 lakh or 75% of the project cost. Maximum 60 percent of the annual dividend received from the respective cluster will be distributed among the members of the group and minimum 35 percent will be deposited in the group account, the remaining 5 percent amount will be spent in the form of administrative work item. A budget provision of Rs 1200.00 lakh has been made for the first year 2020-21



it was decided to increase number of outlets in other locations also. The outlets will be categorized under 2 categories, Regular Organic outlets (10X15 sq feet) and Exclusive Organic Outlets(15X30 sq feet). The former will feed small towns where as the latter will cater to prime tourist destinations. Exclusive outlets are also proposed to open in other cities of the country Exclusive type outlet will run a restaurant also and will serve our original cuisine of Uttarakhand.

Establishment of Farm Machinery Bank /Custom Hiring Centers - to produce more food grains

The farm power in the hilly areas of the state is 0.5 kWh per hectare, while in the plains it is about 3 kWh per hectare. Agricultural mechanization is important to promote farm mechanization in the state and increase the ratio of farm area and farm power to 2 kW per hectare. This will reduce female labour in hilly areas and increase agricultural productivity by 10 to 15 percent. Also, 20 to 30 percent time and total labour cost can be saved.

Under the scheme, villages with low machinery availability will be selected. The cost of the project for setting up a Custom Hiring Center can range from Rs.10.00 lakhs to a maximum of Rs.80.00 lakhs. On the establishment of Custom Hiring Center, maximum 40% or the maximum limit of grant fixed by the

Government of India, whichever is less, will be payable.

A total of 245 Custom Hiring Centers and 1528 Farm Machinery Banks have been established in the state from the beginning of the Agricultural Mechanization Scheme to the year 2020-21. As the first installment for the year 2021-22, 6 custom hiring centers and 35 farm machinery banks have been set up in the target districts, on which work is in progress.

Uttarakhand Seeds & Tarai Development Corporation Ltd. – Making Uttarakhand self dependent in Seeds

Seed is the most important and critical factor in agriculture. Uttarakhand Seeds and Tarai Development Corporation Ltd. (TDC) is continuously working towards making Uttarakhand state self-dependent in seeds and at the same time ensuring seed supply to other states.



Tarai Development Corporation (TDC) was established on 29th June 1969. TDC made an important contribution in the “Green Revolution”, which made the country self-reliant in food production. The Corporation was taken as Mother Project, for establishing similar seed projects in other 5 States of the country under National Seeds Programme (NSP) Phase I. Under NSP II, launched in 1978, this Corporation was restructured with induction of capital from U.P. State Govt. & Government of India through NSC and it started functioning under the name and style of “U.P. Seeds And Tarai Development Corporation Ltd (UPS & TDC)

TDC is a leading seed enterprise in India, which is known by its abbreviation “Pantnagar Seeds” since 1969. “Pantnagar Seed” is a popular brand amongst farmers across the country. The main objective of this corporation is to provide quality seeds of cereals, pulses, oilseeds, vegetables, fodder, green manure and hill variety seeds. The corporation is benefitting the farmers through seed production and by providing certified seeds. There are total 3619 farmer shareholders of the corporation. The corporation produces certified and foundation seed of more than 50 new varieties of different crops in Rabi and Kharif.

GARLIC CLUSTER FARMING

PROFITS MULTIPLY, FARMERS DELIGHTED

Income enhancement of farmers by appropriate market channel of SUDHA as part of UKCDP project

Under the project of Uttarakhand Cooperative Development Programme (UKCDP), SUDHA is playing a vital role as a Technical Advisory Agency.

SUDHA identified 15,000 efficient farmers from five districts of Kumaun regions and formed crop clusters. The clusters were formed as per local area-specific requirements in different geographical regions.

For this purpose, the agency selected five different value chain activities as cluster basis. These included off-season vegetables, pulses, spices, traditional crops (Finger Millet) and bee keeping.

In 2020-21, the agency selected 100 farmers of Garlic cluster in Almora district. Training programs were organized in order to motivate the farmers for garlic cluster farming.

Traditional Technology

Farmers were using traditional technology to grow garlic. As a result production was lesser and farmers were not able to get more return than they invested on crop production. They were not getting appropriate price of their product either. This resulted in loss of interest of farmers in garlic production.

Technical intervention under UKCDP project

In 2020-21, UKCDP decided to motivate the farmers to take up garlic production in the cooperative cluster model. The designated technical agency provided training to farmers on garlic cultivation. Although farmers had sown traditional seeds of garlic, SUDHA delivered training on the package of practices for garlic crop.

The technical staff gave demonstration



at farmers' fields. The farmers learnt to control the attack of white grub insect on crop. They also used a light trap to control it. Farmers treated the seed with *Trichoderma viride* to protect them from soil borne diseases. Seed was sown at 10x15 cm. distance to provide appropriate aeration and space for the enlargement of garlic rhizomes. Hand weeding was done 2-3 times to reduce competition between weed and garlic plants for nutrients. The technical team also diagnosed any diseases of the plant.

Outcome of technical intervention

Following the technical monitoring and



MRS NEELAM BHATT SHILSWAL

General Manager, Information & Broadcast, UKCDP

interventions, farmers saw amazing changes in yield. Where the farmer was getting 70-80 kg of garlic from his plot, the production soared to 140-150 kg of garlic production from 1 nali plot. Total production was 100 quintal from the 4 gram panchyats of Almora district.

Market Linkages of Garlic

By the efforts of the marketing team, farmers got new market linkages for garlic. After appropriate grading and packaging, the produce were marketed by 'SUDHA Aajivika Swayatt Sahkarita Ltd' to Komal Fruit House and Haldwani mandi.

The Result

Where farmers were getting Rs 30-40 per kg of garlic, they got Rs 70. This was a stupendous 75 % increase in their earnings! With the efforts of the project staff, the farmers also saved on the transportation charges.

Impact of facilitation & technical intervention

High profit has rekindled the interest of the farmers in garlic production. Now more farmers want to take up garlic production and want to be associated with the UKCDP project.



UTTARAKHAND'S HORTICULTURE BASKET — ABUNDANTLY DIVERSE

The geographical attributes and climatic conditions of Uttarakhand are ideal for horticulture. Several temperate and subtropical fruit crops are raised in the state. Fruits such as apple, pear, peach, plum, khumani and walnut are produced in the hilly areas whereas mango, litchi, malta, santra, lemon, aonla, guava, and pomegranate are mostly grown in Tarai and valley areas. Major vegetables grown in the state include potato, cauliflower, tomato, onion, brinjal, pea, cabbage and okra. The state has a unique advantage of producing off-season vegetables in hilly areas, which fetches good price in

Uttarakhand ranks first in the country in production of Pear, Peach, Plum and Apricot. For Walnut the state is second and for apple, the third in the country. Uttarakhand produces 14.70 crore spikes of cut flowers and ranks eighth in the country. In terms of productivity the state ranks highest in spices.

the market. Spices such as ginger, garlic, turmeric and chilly too find a significant place in the state.

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Uttarakhand Horticulture Board – Accelerating Production

To holistically enhance production, productivity, quality of produce, processing and market linkages for



horticulture commodities in the state, Uttarakhand Horticulture Board was established during 2015-16. The board had envisioned developing globally competitive and environmentally sustainable anchor horticultural crops' value chains of four agro-climatic zones in the State to ensure prominent place in

National Production and for establishing Uttarakhand as most modern Horticulture State in the country.

Presently, the board is involved in establishing nurseries, distribution of quality planting material / seeds etc. through development of Government Gardens. Providing safety net to farmers

through MSP, branding Uttarakhand produce, organizing buyer-seller programmes, providing Mandi rate of various horticultural crops to farmers through SMS and ensuring marketing of Uttarakhand Tea, Honey are also some important activities carried out by the board. The board also creates Post Harvest Management Centres that cater to customised infrastructure like pack house, cold storage, CA storage & food processing units.

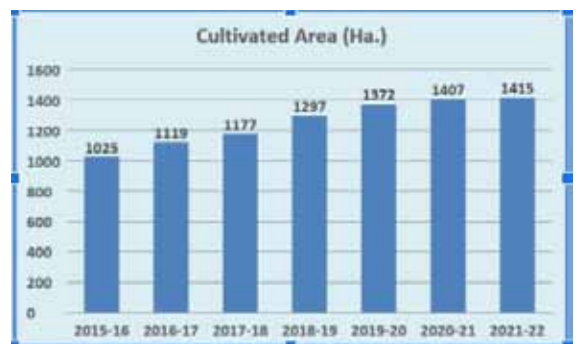
The board has made some bold innovative technological interventions to develop the horticulture sector of the state. Ultra High Density Plantation in Apple has been promoted in the state. Walnut mission was another programme the board had initiated by which area expansion of 100 ha has been achieved. A Post Entry Quarantine Centre was established to monitor import of planting material of Apple / Walnut. International Festivals for Apple, Mushroom and

Post Harvest Interventions

◆ Establishment of Pack House / Integrated Pack House	-	309 No. (306 (Private) / 03 (Public))
◆ Establishment of CA Storage	-	02 No. (01 Public & 01 Private)
◆ Establishment of Mushroom Units (Private)	-	23
◆ Establishment of Cold Chain (Private)	-	13
◆ Establishment of Cold Storage (Private)	-	02

Food Processing Unit

◆ Establishment of Horticulture Base Food Processing Units	-	07
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Spices and Vegetables were organized by UHB. International Bee keeping Festival was also organized.

The board was also proactive in promotion of high value crops. Exotic crops such as Kiwi, Strawberry & Dragon fruits are finding immense popularity in the state. So are high value crops such as banana and papaya. US Nagar and Haridwar are emerging clusters for Guava. Apple, off season veg., garlic, ginger, chilli, potato (tumdi), mushroom (ganoderma & shiitake), coloured capsicum, coloured guava & pear etc., are the focus crops of the state now.

UTTARAKHAND TEA BOARD – Empowering small and Marginal farmers

Keeping in view, the scope and importance of tea in strengthening the Socio-Economic condition of small and marginal farmers, employment generation for unemployed youths through tea cultivation, Uttarakhand Tea Board, has been aiding the tea plantations through suitable interventions. Currently, there are four tea Processing Units. Green Leaf Tea Production is estimated at 4.00 lakh Kg whereas the processed tea production at 0.90 lakh Kg. There has also been a marked increase in the

area under tea plantations. Under the new government, new plantation area has increased to 309 Ha. Green leaf production has increased to



19.26 lakh Kg and that of processed tea to 3.89 lakh Kg. Sale of processed Tea has increased to 3.76 lakh Kg.

To expand area under tea cultivation, UTDB has taken land from farmers on lease for 15 year land lease with rent dependent on production. On these lands, adhering to the best possible standards, highly technical nurseries with top grade planting material are being established. They are also committed to certified Organic tea cultivation. Besides this, UTDB is also helping farmers develop their own garden. The board is promoting clusters of at least 60 hectares. Under this segment around 5000 ha has been covered. Subsidized planting material are also provided to farmers and all technical assistance is given free of cost. Green leaf produced by these farmers are governed by a buy back arrangement between farmer and UTDB/Society/Private run factory. For tea gardens developed by private entrepreneurs lease of fallow and non utilized land by farmers are given to private entrepreneurs from land bank created by UTDB in which private party shall establish his own factory on leased or bought land. UTDB acts as mediator for green leaf prices as well as providing all state level facilities.



BHESAJ DEVELOPMENT UNIT

To develop Uttarakhand as a Herbal State



Bhesaj Development Unit has been instituted for producing quality planting material and production of Medicinal and Aromatic plants (MAP). Sustainable collection of MAP from the forest, enhancing livelihood through capacity building of the farmers and promotion of marketing are other objectives of the unit.

The unit selects species of medicinal plants according to the demand of market. Farmers are also selected by them and they undergo training. They also distribute planting material, free of cost to the selected farmers.

The government has been prioritizing cultivation of potential species, production of quality planting materials and cluster development. Besides potential species such as



Dr HS Baweja
 Director Horticulture

Puskarmool, Himachali kala jeera etc., are also being promoted. Herbal Tourism through herbal parks and herbal Gardens, research and development, MoU with pharmacies and technical collaborations with Spice Board, Sikkim; DRDO Leh; H.P. Agri. University, HAPPRC, Srinagar etc are also being explored by the government. As a result of the continued support by the government, the herbal sector has achieved many accolades. Uttarakhand Tejpat (GI No. 520) has received geographical indication. Puskarmool and Himachali kala jeera at Pithoragarh have been successfully introduced. Seabuckthorn product development, MoU for seabuckthorn trade, development of Herbal Teas, herbal Salt and development of Herbal Gardens are other notable achievement of the unit.

EMBRYO TRANSFER TECHNOLOGY FOR INDIGENOUS BREED CONSERVATION

Another notable feat by the Uttarakhand Livestock Development Board was the adoption of embryo transfer technology. This technology happens to be the most widely used technology for faster genetic improvement of cattle worldwide.

Embryo transfer (ET) refers to the technique by which embryos are collected from the reproductive tract of a genetically superior female and transferred to another animal which may be genetically inferior. Through embryo transfer program more progenies can be produced from their best cows. The embryos produced from elite donor cows can also be cryopreserved for future use which can be easily transported across the country and continents.

Embryo Transfer technology has been successfully implemented in conservation and genetic improvement



of Red Sindhi cattle: The Red Sindhi is among the four finest indigenous milch cattle breed of the country. A small pure herd of Red Sindhi was available at Animal breeding farm, Kalsi in Uttarakhand established in the year 1937 by an anonymous businessman which is now managed by Uttarakhand Livestock Development Board (ULDB). Under the National Project for Cattle and Buffalo Breeding the farm got a face lift and realizing the importance of this biotechnological tool the Department of

Animal Husbandry, Dairying & Fisheries, Government of India under the National Project for Cattle and Buffalo Breeding (NPCBB), provided the funds for in situ conservation and rapid multiplication of Red Sindhi breed through use of Embryo Transfer Technology (ET).

The application of modern reproductive biotechnological tool - Embryo Transfer Technology (ETT) –for the conservation and rapid propagation of Red Sindhi at Animal breeding farm, Kalsi has become a shining



Dr Prem Kumar
Director, Animal Husbandry

Breeds	Red Sindhi	Sahiwal	Gir	Jersey	Total
Cows	147	29	01	05	182
Heifers	154	19	19	09	201
Female calves	66	11	01	0	78
Bull Calves	38	07	0	02	47
Total	405	66	21	16	508



S.No.	Description	Progress
1	Doner used in In Vivo embryo production	249
2	Embryo Recovered	2342
3	Transferable Embryo	1708
4	Embryo Preserved	760
5	Total Embryo Transferred	1299
6	Total Pregnancy Established	527
7	Total Calves Born	412
8	No. of Trainees on ETT and Farm Management	146
9	No. of Embryos Distributed/Sold	296

example for the indigenous breed conservation programme. The extensive crossbreeding programme during the operation flood had affected the farm breeding programme. In the year 2003 the total female strength of Red Sindhi cattle left in the farm were 55, with cows 31, heifers 20 and four female calves with the farm lactation yield of average 1300 kg. Today with the intervention of ET program, the farm is has an impressive strength of more than 400 Red Sindhi pure and graded Red Sindhi female

No of donors aspirated – (total 12 donors)	202
No of oocytes recovered	2105
No of Embryos developed	578
No of Embryo transfers	350
No of IVF pregnancies established ,	140
No of IVF calves born	102

population with farm lactation yield average of 2200 Kg. The Embryo transfer work carried out at Kalsi for conservation and genetic improvement of Red Sindhi is considered as the shining example of In Situ breed conservation of Indigenous breed the whole country. Under National Project on Bovine Breeding funded by

The application of modern reproductive biotechnological tool - Embryo Transfer Technology (ETT) –for the conservation and rapid propagation of Red Sindhi at Animal breeding farm, Kalsi has become a shining example for the indigenous breed conservation

DAHD GOI, Sahiwal and Gir has been inducted in the farm.

Embryo transfer technology for conservation and genetic improvement – The ETT is being conducted in various Indian Breeds such as Red Sindhi, Gir, Sahiwal , Malvi , Rathi and Tharparkar. Embryos are produced at the farm and farmers' door step and transferred to recipients available in the farm and the field.

Imported frozen embryo transfer programme: Holstein and Jersey frozen embryos are imported from Canada and USA . Total of 422 frozen embryos imported , 260 embryos are transferred resulting in 120 pregnancies and 112 calves born.

Male calves of Jersey and Holstein 30 and 24 respectively are sent to semen stations across the country for semen production.

Rashtriya Gokul Mission – Ovum Pick Up In Vitro embryo transfer - Ultrasound guided Ovum Pick up facility has been developed at Kalsi. Government of India has notified ET center at Kalsi as a Center of Excellence on Indigenous Breed of the country. World class state of art OPU-IVF lab has been set up.

Apart from it field mobile ET lab is developed along with national level ET training facilities.



The Institution has been providing national level training to Scientist, University professors, field veterinarians across country. Technical assistance for conservation of other Indian breeds such as Sahiwal through ET in Uttar Pradesh, Malvi cattle in MP and Rathi cattle in Rajasthan. ULDB is also providing consultancy services in establishing IVF laboratories to various Universities and state government institutions.

POULTRY FARMING RAISING LIVING STANDARDS IN UTTARAKHAND



Dr Chetna Dhapola
Deputy Director, Animal Husbandry

Poultry farming has the potential to raise the living standard, provide self employment, stop migration and provide a good source of protein. Uttarakhand has been expanding poultry sector through several projects and training. Many farmers are coming forward lured by the lucrative nature of the business.

Poultry Projects galore

The Department Of Animal Husbandry, Uttarakhand is has been running various poultry projects and providing low input technology (LIT) chicks to the farmers. At present more than 10 lakhs chicks have been produced and distributed to the farmers.

Under National Livestock



Mission(NLM) Mother Poultry Unit(MPU) and Innovative Poultry Productivity Project(IPPP) are being implemented. Under MPU 39 MPUs have been established.3510 backyard beneficiaries in 13districts are rearing LIT birds. Under IPPP ,800 beneficiaries in 4 districts of state are rearing LIT birds. Under Zila yojana, Backyard poultry scheme is implemented. Till date 110492 people have been benefited from this scheme. Backyard Poultry farming is a low input business mainly practised in rural areas by rearing poultry birds in small numbers in backyard with indigenous night shelter and scavenging system with little supplementary feeding. It is the most potent source for subsidiary income.

There are 8 IPDP's (Integrated Poultry Development Project) in the state which gives necessary training to the beneficiaries regarding poultry keepings and Department monitors all the programmes and provides all sort of information and help to the farmers regarding poultry keeping.

Poultry Success Stories

According to the 20th livestock Census, 43412 households are engaged in poultry keeping in Uttarakhand. It gives additional income to the rural communities as well as is the source of required protein to low income families in the form of egg and meat. It is a promising start up.

Under Mother Poultry Scheme of NLM Mr Narendra Gobari, village Bhatari, block Munakot, Pithoragarh was provided assistance for construction of mother poultry farm. The department gave him 1500 days old chicks for 6 different batches which he distributed to 90 backyard farmers by rearing them for 1month.

Later on Youth of Bhatari and surrounding villages started poultry farming under the scheme of MSME and NLM. They were fully supported and encouraged by Department of Animal Husbandry. At present there are more than 30 farms in the village. The average capacity of farms is 1000birds per batch .Farmers are getting an average income



of 1-1.5 lakhs rupees per annum.

Bhatari and surrounding villages are known as Poultry Hub of Pithoragarh and farmers from different districts come here to see and learn poultry farming

Pan Singh Parihar,village Mujholi, Bagwalipokhar, Almora earned around Rs. 80,000 as profit under MPU scheme. Later he also reared chicks for distribution under IPPP scheme and now he is running a farm with around 3000 birds. At present he is earning more than Rs. 2.5 lakhs per year profit from poultry farming.

Smt. Kaushalya Devi of Chachai village, block Kapkote was benefitted under SCP Backyard Poultry Scheme in year 2020-21. She used self-

cultivated grains, waste vegetables and other kitchen waste to feed the birds. Controlled grazing was also followed to rear the birds. Till date, 35 grown birds and 800 eggs have been sold at an average price of Rs. 600 per bird and Rs. 7 per egg producing an income of Rs. 26,600. The beneficiary has started rearing new flock from her earnings.

Shri Devendra Singh Mehta, of Walthi Village, Madkot , Block Munsyari, District Pithoragarh was provided 50 DOCs with poultry feed and supplements under the backyard scheme in 2020-21.Presently he is having 40 Kruoilers and he is getting 8-10 eggs per day and earning 100 Rs daily. Now he is expanding his backyard unit to a farm of 500 birds.

The backyard Poultry can be easily managed by women and children. Smt. Rajkumari, of Netala village, Uttarkashi is expanding her backyard unit with her earnings.

Shri Mahendra of village Patkot, Ramnagar, Nainital, a MPU beneficiary is earning good income by selling eggs and meat.Now he is expanding his backyard unit by his earnings.

Shri Narender Rana, Village Khogcha,Tehri, IPPP Beneficiary got 200LIT birds in the first phase of the project and is earning around Rs 600 per bird and his family is getting good source of protein from consumption of eggs.

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SEX SORTED SEMEN TECHNOLOGY GAME CHANGER FOR DAIRY



Dairy farming in India is entering a new phase. With the concept of natural farming and organic farming spreading fast across the nation, importance of dairy farming has increased manifold. India is the world's number one producer of milk. India is also the country with largest number of livestock. Unfortunately this fete has become a burden on the Indian farming sector. With traditional use of male cattle in the fields primarily for draught purposes or for breeding now being obsolete due to technological advancement, the country is tackling with a huge population of unwanted male cattle. Some of them turn into stray, others remain with the farmer consuming his resources reducing his income and hence his / her interest in dairy farming.

To tackle this problem and to rekindle the interest of people in dairy farming,

Sexing Technologies uses the patented "Sex Ultra™ technology that separates the X chromosome bearing (female) sperms from the Y chromosome bearing (male) sperms that results in sex sorted semen containing close to 100% live sperms.

the government of India, under Rashtriya Gokul Mission (RGM), conceptualized the project for producing sex sorted semen, which can lead to birth of only female progenies out of artificial insemination. Proposals from different states and organisations were invited to initiate sex sorted semen production of indigenous breeds in India and Uttarakhand was the first state to respond to it and bag the prestigious project.

The project for "Establishment of Sex Sorted Semen Production Facility at Deep Frozen Semen Production Centre, Rishikesh" received grant in aid under the centrally sponsored scheme Rashtriya Gokul Mission

during 2018-19. Based on technical requirements Sexing Technologies, USA was selected to provide services for semen sorting. An agreement for the same was signed between Uttarakhand livestock development board and Sexing Technologies, USA at Pashudhan Bhavan, Mothrowala road, Dehradun in 2018.

Sexing Technologies is the worldwide leader in Sexed Semen and Embryo production. Sexing technologies is the pioneer in sex sorting of bovine semen and has now started production of sex sorted semen in India from different breeds of cattle and buffaloes. Sexing Technologies uses the patented "Sex



Dr. Puneet Kumar
Deputy Director

UltraTM technology that separates the X chromosome bearing (female) sperms from the Y chromosome bearing (male) sperms that results in sex sorted semen containing close to 100% live sperms. Sexed UltraTM technology also removes the dead and dying sperms before and during the sorting process which makes the sorted semen highly fertile. It produces high fertility sex sorted semen with over 90% female purity, ranging from 90 to 95%, and fertility that matches to that of conventional semen.

The infrastructure for the establishment of the production unit was completed within a record time of roughly four months from date of commencement. After the standardization protocols were completed the lab was made fully operational with its lokarpan on dated 7th March 2019 by the hands of hon'ble chief minister of Uttarakhand, Shri Trivendra singh rawat ji.

The project is first of its kind in whole nation, in the government sector, with the aim to double farmer's income in Uttarakhand and nation as a whole.

The laboratory has since then come a long way in production of sex sorted semen, primarily of indigenous breeds of cattle and buffaloes. The breeds include HF, Jersey, Red Sindhi, Sahiwal, Gir, Hariana, Badri, crossbred HF, crossbred Jersey and Murrah. The laboratory was able to successfully achieve its production target of 2 lakh doses in the first year and 3 lakh doses in the second year of its operation. This included production of



The project is first of its kind in whole nation, in the government sector, with the aim to double farmer's income in Uttarakhand and nation as a whole

1.23 lakh doses of indigenous breeds of cattle and buffaloes in the first year and 2.34 lakh doses of indigenous breeds of cattle and buffaloes in the second year. The third year is continuing on the similar trend and till November 2021, 1.99 lakh doses of indigenous cattle (1.61 lakh doses) and buffaloes (0.38 lakh doses) have been produced. In addition 0.80 lakh doses of exotic (28889 doses of HF and 50940 doses of Jersey) and 0.10 lakh doses of crossbred have been produced in the first year of its operations. Second year also saw production of 5212 doses of exotic (3149 doses of HF and 2063 doses of Jersey) and 9981 doses of crossbred breeds of cattle. A total of 6.75 lakh doses of sex sorted semen has been produced till November 2021.

The semen distribution has also been gradually increasing with a total of 0.50 lakh doses, 2.53 lakh doses and 1.68 lakh doses distributed in the year 2019-20, 2020-21, 2021-22 respectively. Out of the total 4.73 lakh doses distributed, 30426 doses have been supplied to various other agencies outside Uttarakhand. These include states like Telangana, Manipur, Gujarat, Madhya Pradesh, Tamilnadu etc. The production has been duly supported by the usage of semen in the field inseminations. Being a

new and expensive technology, farmers had certain reservations about its usage in the beginning. This was reflected in the low inseminations (11048) during the first year of its operation. But as time passed by and the farmers were able to fathom the positive impact of technology and its success in field results, there was a drastic increase in uptake of the technology. Out of the total insemination in the year 2020-21, 129352 inseminations (16.65%) were from sex sorted semen as compared to first year in which only 1.46% of total AI were from sex sorted semen. The technology has also been able to prove itself in the field. Out of the total 15874 calves reported to be born in the field, 90 % have been females. This has been a huge achievement as 40 % more females are being born which will lead to 40 % more milk production and hence more income to the farmers.

The entire project has been a huge success with its results till date. Certain notions about sex sorted semen like very low conception rates and usage in only selected animals of certain age and groups have been dispelled to some extent. Now the farmer is more than ready to use the technology to it's own advantage. The past two and half years have prepared the ground for its increased usage in the state and country as a whole. And to top it all, the successful production and usage of sex sorted semen of indigenous breeds will go along way

Sex sorted semen can be a game changer for increasing the income of livestock owners. Its impact is manifold than when compared to breeding animals using a conventional semen.

SURABHI VATIKA

INDIA'S BIGGEST AROMATIC GARDEN



Uttarakhand is home to India's biggest aromatic garden, 'Surabhi Vatika'. Established in an area of over 3 acre in in Lalkuan of Nainital district, the garden has 140 different species of aromatic species sourced from across India.

The project was the result of the untiring efforts by the research wing of Uttarakhand forest department. The project was initiated in the year 2018-19 after approval of the Research Advisory Committee in June 2018 with objective of conservation of various aromatic species, to create awareness about these species, promote further research about these species and to link it with livelihood. It took three years for the project to complete.

The project has been funded under CAMPA (Compensatory Afforestation Fund Management and Planning Authority) scheme of the central government. Lalkuan was selected as the site because it is known for perpetual problem of foul smell due to the stench that comes from certain industrial units.

Established in an area of over 3 acre in in Lalkuan of Nainital district, the garden has 140 different species of aromatic species sourced from across India

The aromatic garden has a Tulsi vatika which contains more than 20 species of Tulsi, including Rama Tulsi, Shyam Tulsi, Van Tulsi, Kapoor Tulsi as well as African, Italian and Thai Tulsi.

Aromatic garden is divided into 8 different sections, apart from Tulsi Vatika- aromatic leaves (Lemon balm, Rosemary, Kapoor and various mint species), aromatic flowers (Chameli, Mogra, Rajnigandha, Kewda); aromatic trees (Chandan, Neem Chameli, Naglingam, Parijat); aromatic rhizomes (Aama Haldi, Kali Haldi); aromatic seeds (Kasturi Bhindi, Badi ilachyi, Timur, Ajwain); aromatic grasses (Lemon grass,

Java grass, Khas grass); aromatic bulbs (Red ginger, Sand ginger) and aromatic roots (Pattharchur, Vach) grace these sections

The garden also includes Chandan from South India, Agarwood from North east, kewada from Coastal areas and Parijat from Tarai Zone, apart from Neem Chameli, Hazari Mogra, Sontaka, Cahmeli, Raat ki rani, Din ka raja and Anant are some of the most fragrant popular species present in the aromatic garden.

It also has nine different species of jasmine, four different species of four different species of haldi and three different species of ginger. The extracts of these aromatic plants are used in cosmetics for flavouring and fragrance purposes. Likewise, these plants are of great utility in spices, pesticides and repellents making.

There will be a likely expansion of the garden to 45 hectares in the next phase which involves developing a conservation and training center where the farmers can learn to grow and conserve the species which have commercial viability

Mana Herbal Park – Standing Tall

At 11000 ft, India has developed first 'highest' herbal park in Uttarakhand. Situated in Mana Village, Chamoli district, the park is situated close to the Indo-China border.

The park is established on an area that is spread across 3 acres donated by the Mana Van Panchayat and developed by the Research Wing of Uttarakhand Forest Department. It took three years to develop this park under the Central Government's Compensatory Afforestation Fund Management and Planning Authority (CAMPA) scheme.

Hosting around 40 species that are usually found in high-altitude alpine areas in the Indian Himalayan region, the park has been divided into four sections.

The first section contains species associated with Badrinath (lord Vishnu), which includes Badri Tulsi, Badri Ber, Badri Tree, and sacred tree of Bhojpatra. Badri Tulsi, which is scientifically named as *Origanum vulgare*, is found in this area and forms important part of offering to lord Badrinath. Various researches have established its multiple medicinal benefits. Badri Ber, which is scientifically known as *Hippophae salicifolia*, and locally called as Amaesh, is another nutrition-rich fruit and used widely.

The second section is dedicated to Ashtavarga species which is a group of eight herbs found in the Himalayan region namely Riddhi (*Habenaria intermedia*), Vriddhi (*Habenaria edgeworthii*), Jeevak (*Malaxis acuminata*), Rishbhak (*Malaxis muscifera*), Kakoli (*Fritillaria roylei*), Ksheer Kakoli (*Lilium polyphyllum*), Maida (*Polygonatum cirrhifolium*), and Maha Maida (*Polygonatum verticillatum*), which are the most important ingredients



The park is an attempt to help conserve various medicinally and culturally important alpine species, and facilitate a study on the propagation of these species, as well as their ecology.

of Chyawanprash. Out of these, four herbs belong to the lily family and four belong to the orchid family.

The third section will have Saussurea species and include Brahmakamal (*Saussurea obvallata*) which is also the state flower of Uttarakhand. Other Saussurea species at the park include Nilkamal (*Saussurea graminifolia*), Phemkamal (*Saussurea simpsoniana*),

and Koot (*Saussurea costus*).

The fourth section will have assorted alpine species including Meethavish, Ateesh, Choru, and Vankakdi, all of which are medicinal herbs and are in great demand.

Besides, trees of Thuner (*Taxus wallichiana*), whose bark is used in making cancer drugs, Tansen and Maple trees have also been grown in the park.

Many of these species are endangered and threatened as per International Union for Conservation of Nature (IUCN) red list as well as by the State Biodiversity Board. It includes many important medicinal herbs also.

The park is an attempt to help conserve various medicinally and culturally important alpine species, and facilitate a study on the propagation of these species, as well as their ecology.

The park was inaugurated by the Sarpanch of Mana Van Panchayat.



DIVERSE FARMING STYLES OF UTTARAKHAND

Situated on the southern slope of the mighty Himalayas, Uttarakhand has most of its area under forests and wastelands leaving only a small amount of land i.e. 7.41 lakh ha (about 14%) for cultivation out of the total reported area of 56.72 lakh ha. In that limited area Uttarakhand has devised its own methods and practices that intend to safeguard their livelihood and food security without compromising on ecological balance.

Due to the predominance of hills, subsistence agriculture, practiced on small terraced fields in Uttarakhand, forms the primary source of livelihood for a majority of the state's population. Estimates suggest that 70% to 80% of the working population in remote hill villages is engaged in agriculture and animal

husbandry.

Inaccessibility, environmental heterogeneity and ecological fragility have made subsistence production system the preferred form of farming in the hill state. Due to harsh topography and climate and the subsequent inaccessibility of the area, traditional mountain farming systems in Uttarakhand were self-sufficient, self-contained, closed systems, which did not require any outside input. Instead, traditional management and ecological knowledge have been the vital means by which farming communities have evolved diversity rich, food production and livelihood systems.

Terrace Farming –Cutting Across Slopes

For thousands of years, terracing has been one of the most important systems

for preventing soil erosion, conserving water, and increasing agricultural production. Terraces are built along contour lines to increase the arable surface area and conserve water and soil. Terraced fields can be of different shapes and sizes, and consist of a flat section and a near vertical riser, protected by a wall of dry stones, soil, grass, or trees. The flat surface created by terracing is generally used for cultivation. Terraced fields were constructed in Southeast Asia as early as 5000 years ago, after which the technique gradually spread to the northern and southern shores of the Mediterranean. The shortage of arable land together with technological progress and population growth resulted in the global distribution of terraces.

Terrace farming rearranges farmlands to convert slopes and hilly



terrains for growing crops. A part terrace is a plane slop cut into a series of flat surfaces for effective farming. Platforms are known as terraces. There are several benefits associated with terrace farming apart from making steep slopes arable. It helps in water conservation, slows down and reduces water runoffs and improves rainwater collection. Besides adding to ecosystem diversity, this system of farming decreases water pollution and sedimentation. Water stays enough to settle the heavy particles and stop downstream sedimentation and water bodies' pollution. It prepares hilly land for farming and helps to increase food availability in the region cut off from the main land due to its geography.

Baranaja – Way to sustenance

Uttarakhand's hilly terrain had necessitated the adoption of terrace farming. So were several practices indigenous to the region. Each of these indigenous systems were methods for surviving the harsh terrain and climate.

Baranaja (literally meaning twelve grains), for instance ensured them sustenance. This system is a traditional mixed farming system widespread across

the rain fed Garhwali agricultural regions in Uttarakhand. In the baranaja system, twelve, or sometimes more, crops are intercropped. Cereals, lentils, vegetables, creepers and root vegetables are grown in this companion planting system. All crops are planted together on the same terraced fields in the kharif / chau masa or monsoon season.

The twelve crops are selected such that they can grow in harmony with each other. The creepers of legumes use the stems of grains/plants as a natural support, while the grain roots grip the soil firmly, preventing soil erosion. Due to their nitrogen fixing abilities, legume crops return to the soil nutrients which are used by other crops. Besides, plants grow at different levels or storeys much like a natural forest, thereby utilising multiple levels of space on the same terrace. No external chemical inputs are used and pest control is achieved through the use of leaves of the walnut and neem, and the application of ash and cow's urine.

Among the grains (cereals and millets), there is usually mandua (finger millet), ramdana (amaranthus), kuttu/ogal (buckwheat), jowar (sorghum) and makki (corn). Pulses and beans include rajma, lobia, bhatt, gehat, naurangi, urad and mung. Oilseeds like til, bhangjeer, sann, bhang and vegetables like ogal, chollai, kheera, lobia are also grown. Spices include jakhiya and til (sesame) and fibre plants include sann and bhan.

Pulses, lentils and beans are planted on rocky lands while mandua, lobia and

ramdana thrive on fertile lands. Crops like ogal, bhangjeer and bhang usually occupy the borders. Different versions and combinations of this essential concept are planted across large parts of Garhwal, according to local conditions and community and farmer preferences.

The concept of the twelve grain system helps maintain ecological balance, and enables farmers to benefit from certain varieties even if some crops are damaged. In the hilly areas, most peasant families have very limited landholdings. Hence, it is not possible to plant different staple food crops separately. Different crops harvested at different times of the year provide security against food shortage, as well as against drought and crop failure in a small piece of land. Diversity in crops also helps in maintaining soil fertility and replenishing nitrogen, besides providing nutritional security. Millets are rich in calcium, iron, phosphorus and vitamins, while legumes are a rich source of proteins. For domesticated animals too, there are diverse types of fodder and straw from the crops, thus providing them well rounded nutrition. The nutrition needs of different plants are also balanced out. If some cereal and millet plants are heavy feeders like corn and mandua, others (notably pulses, beans and oilseeds) are big nitrogen fixers for themselves and others around. The soil is well covered through the monsoon, there is a big leaf fall, and the crop stubble and roots are left in the fields after each harvest.



Agriculture in Uttarakhand is intertwined with their Cultural practices

Communities in Uttarakhand have elaborate religio-cultural practices in the form of festivals, and exchange their knowledge regarding agriculture. Most of these festivals begin with the worship of local gods and goddesses, with offerings of produce to main deity of the village. These practices promote seed preservation and conservation of biodiversity. These cultural practices follow Vikram Samvat calendar.

Few cultural practices promote testing of different seeds promoting crop diversity and conservation. Harela festival, which is celebrated on the Sankranti of Assar month (Vikram Samvat), is specifically related to seed testing of different species. Culturally, every family has to participate in three testing. Harela stands for first, followed by two testing in each occasion of both Navaratri festivals. During Navratri, community members sow minimum seven types of grains and pulses in their households or in temple on the bed of soil collected from their fields. This is a symbolic cultural reflection of seed conservation, crop rotation and mixing.

Similarly festivals of Phool Dei and Ghee Sankranti have a relation with nature and people pray for abundant crops and general well being of their families. Phool Dei is celebrated on the first day of Chaitra or in mid March and shows the advent of spring. Young girls go to every house in their villages with plates full of rice, jaggery, coconut, green leaves and flowers and put forward their good wishes for the prosperity of the household. They sprinkle auspicious flowers and rice on the doorsteps.

Ghee Sankranti is on the first day of the Bhado month (mid August) of the Hindu lunar calendar. This is a very significant festival of the farming community. A variety of agricultural tools are swapped on this day. It is throughout this point in time that the yield is abundant and green and vegetables grow in profusion.

Uttarakhand's unique geographic conditions have imparted several disadvantages. The farmers of the state, through years of wisdom and knowledge have converted these shortcomings to their advantage and devised several agricultural practices unique to this region. By adopting organic agriculture officially the state has ensured that in the coming years too, the ecosystem as well as their biodiversity is safe in their hands.



The Harela festival

Sari or Sar is part of terrace farms which is being used for cropping during a particular season. Two Saris are generally designated on the basis of their location around the village. Terrace farms present above the village known as Malli Sari and below the village known as Talli Sari. Similarly, terrace farms present in the left side of the village are known as Walli Sari and right side of the village, Palli Sari.

In a village, either Talli-Malli or Walli-Palli categorization of Sari is followed. During a particular year, if Talli Sari is used for rice farming, then Malli Sari would be used for the farming of millets, legumes and amaranth. However, in the subsequent year, the opposite pattern is followed.

The Sari provides vertical distribution of crops in different hill elevations to support and maintain agro-biodiversity of the locality. Crops being cultivated in different elevation of hills, i.e. higher Himalaya, mid-elevation and the valleys, vary significantly. Sari system is an important on-farm conservation system for the landraces of the area.

Sari System – Ensuring Diversity

The Sari system is characterized by the rotation of crops in different seasons in a part of terrace farms. On the basis of elevation, terrace farms in Uttarakhand are broadly categorized into two groups. The high hills areas are known as Danda and comparatively low elevated hill areas are called Gangarh. Meteorologically Danda area receives more rainfall and snowfall than the Gangarh. Consequently,

Gangarh areas are rainfed. On the basis of the available irrigation facilities, farms are also categorized into two groups: irrigated fields (locally known as Sera) and non-irrigated fields (locally known as Ukhad/Usar).

Irrigated farming is limited only to valley areas, while the rest of the hilly areas practise Ukhad system. In the Ukhad system, people follow the Sari system of cropping for crop rotation.

AMRIT FROM DEV BHOOMI

UTTARAKHAND'S BOOMING ORGANIC AGRICULTURE

Uttarakhand- Dev Bhoomi – the Land of Gods – pristine and nestled in nature's lap, has close to fifty per cent of the land covered under forest. Rich in biodiversity, this green state has rightly chosen the path of organic agriculture. As a way of farming that out rightly excludes the use of chemicals in any form, organic farming ensures harvests that are safe for human health and friendly to the environment. In the absence of chemical fertilizers and insecticides, organic farming is primarily based on the principles of use of natural organic inputs and biological plant protection measures. Properly managed organic farming eliminates possibilities of water pollution and helps conserve water and soil on the farm thereby enhancing sustainability and agro-biodiversity. A state that hosts the mighty Himalayas, with a rich growth of flora and fauna and 30 rivers that either originate or cross Uttarakhand, transforming to organic agriculture was the wisest move by the state.

Organic Agriculture Act

In 2019, Uttarakhand became the first

state in India to introduce an 'Organic Agriculture Act'. The state also declared 10 of its blocks as fully organic. These blocks are spread across Dunda, Pratapnagar, Jaihari khal, Jakholi, Augustmuni, Ukhimath, Dewal, Salt, Betalghat and Munsyari. The act criminalizes the sale and purchase of chemical fertilisers and pesticides in select blocks notified under organic farming.

Through the Organic Agriculture Act, the government has taken official steps toward turning the state fully organic. Under the new act, NGOs, private entities, and traders engaged in the export market and processing of organic products will be regulated. The sale of chemical fertilizers will also be regulated and the act allows for penalties for banned substances, fines for which may reach up to one lakh rupees. The act will also help simplify the certification process, which will facilitate the organic certification of agricultural products. Moreover, Uttarakhand's agricultural produce will emerge as a distinct brand, so the mountain state can export organic produce internationally, something that will benefit the local farmers and help in

increasing their income.

However, the transition of Uttarakhand to an Organic State would be a much easier proposition when compared to other states. The landholdings in the state have traditionally remained smaller and stable over years. Despite population increase, the area under agricultural land use has not changed much over the past 30-40 years in Uttarakhand Himalayas as a result of socio-cultural restraints as well as legal ban on conversion of notified forests since 1890s, policies of supplying a quota of food grains at subsidized price, and promoting off-farm economy since 1970s. Majority of the traditional settled upland agriculture is organic by default due to the lack of access to agrochemical and also poor crop response to chemical fertilizers in the widespread rainfed conditions.

This Himalayan state is rich in the key inputs for sustaining organic farming, the hill region is rich in forest cover (64% of total area), the primary source of traditional farmyard manure (leaf litter and 50-70% of livestock feed available from forests) and water resources (upper catchment of the snow-fed Ganga and >1000 mm annual rainfall).

Uttarakhand Organic Commodity Board – Where it all began

Even before the conception of Organic act, the state had made pronounced overtures towards strengthening organic agriculture. An organization was created to promote, coordinate, organize and help Organic farmers in the state. Uttarakhand Organic Commodity Board (UOCB) came in to existence on 19 May 2003. UOCB functions as the nodal agency for organic agriculture in the state and is registered under the Societies Act in May, 2003. It acts as the nodal agency





of the state to enhance organic activities in agriculture and allied sectors like Horticulture, Medicinal Aromatic Plants & Herbs, and animal husbandry throughout the state. On-going programmes, many of which are funded externally presently provide the source for human resources for the technical and marketing activities.

A project called Center for Organic Farming (COF), "Himotthan Pariyojna", funded by the Sir Ratan Tata Trust was anchored within the Board for providing technical and marketing expertise for product development, supply chain management, market linkages, certification etc.. The board is a resource center for trained manpower in different aspects for organic agriculture. UOCB has trained and experienced personnel for the production, quality control, marketing as well rural development. UOCB is presently working as a service provider for different departments for the promotion of organic agriculture.

Crop certification is being facilitated under the internal control system supported by COF, Regular training is being provided by the field staff available with different programmes. The certification is done by a team of field staff, internal inspectors and



Quality Managers in coordination with an External Certification Agency.

The main objective of UOCB is to provide training to farmers, extension workers from government line departments, NGOs in the field of production, certification as well as marketing. UOCB organizes exposure visits for farmers, middle and senior level officers for seminars, exhibitions and other gatherings in Organic sector. UOCB has converted few districts into bio-villages

Initially, a pilot programme of demonstration of certain technologies was taken up in 16 villages of

Uttarakhand. Later, it was expanded to 212 villages. The term bio-village has evolved along with the development of demonstration villages to 100 per cent saturation villages where commodity production, certification and market linkage has been established. Presently, 1,200 bio villages are covered under the organic programme and 20,000 farmers have been sensitized.

Organic Agriculture Blooms in the state

The efforts by Uttarakhand Government helped change the trajectory of farming in the state. Instead of succumbing to

the perils of intensive chemical centric agriculture, the state had managed to capitalise on its assets and focus on its strengths. Area under organic agriculture has increased manifold. Forty per cent of the country's total organic farming is being carried out in Uttarakhand

The total organic farming area in Uttarakhand has witnessed a 23% rise during the last three years. Out of the total agriculture area, 8% land was being used for organic farming in 2017 and the figure went up to 21% in 2020. In 2017-18, a total of 585 clusters with 2,92,50 farmers were practising organic farming on 11,700 ha. In 2020-21, organic farming was adopted by 4.59 lakh farmers on 2.18 lakh hectares in the state. The Uttarakhand government has a target to certify 31% of the total agricultural land as organic in 2021 to expand the area under organic farming.

Uttarakhand government has approved organic farming in 42 villages in five districts of the state in the vicinity of the river Ganga under the 'Namami Gange' project. About 3,900 organic farming clusters have been identified between financial years 2018-19 and 2020-2021 under which organic farming is being implemented in 50,000



hectares of area benefitting over 1.25 lakh farmers. The decision aims to curb pollution right from the river's origin at Gangotri till Gangasagar in West Bengal



where the river merges into the Bay of Bengal. The length of Ganga in the Himalayan state including its tributaries is about 250 km. In Uttarakhand, where the holy river originates, the project will cover the villages located alongside it from Devprayag in Tehri Garhwal district where its two main tributaries Alaknanda and Bhagirathi, merge in it. The initiative also includes the villages adjacent to the two tributaries till Haridwar from where the Ganga enters in neighboring Uttar Pradesh.

Uttarakhand has turned out to be an important exporter of organic products as well. About 30 farmers of Nayal village in Pithoragarh district of Uttarakhand have converted about 12 hectares of land into a tea garden. Certified organic, the tea has found buyers from UK to Dubai. India's First consignment of millets grown in Uttarakhand was exported to Denmark this year. APEDA, in collaboration with Uttarakhand Agriculture Produce Marketing Board (UKAPMB) & Just Organic, an exporter, has sourced & processed ragi (finger millet), and jhingora (barnyard millet) from farmers in Uttarakhand for exports, which meets the organic certification standards of the European Union. This year, India's first consignment of vegetables including curry leaf, okra, pear and bitter gourd sourced from the farmers of Haridwar, was exported to Dubai. APEDA has been carrying out promotional activities to bring Uttarakhand on the agricultural and processed food products export map of India. APEDA is planning to provide financial assistance for setting up a pack house in Uttarakhand which would fulfil the mandatory requirement or infrastructure for export of fresh fruits and vegetables to the international market.

India's Dev Bhoomi is in the process of churning Amruth for itself and the world. The sustained efforts from the government to popularise organic farming is in fact assuring. No doubt the state would soon achieve its milestone of being 100 per cent organic.

RESTORING PRIDE IN AGRICULTURE

National Mission on Agricultural Extension (NMAET) under Sub Mission on Agricultural Extension (SMAE) Presently Support to State Extension Program for Reforms (ATMA)



For the strengthening of agricultural extension programs, in the year 2007-08, "Agriculture Technology Management Agency (ATMA)" scheme is being operated in all the 13 districts under the centrally sponsored "Support to State Extension Program for Extension Reforms" scheme. Inter-departmental implementation committees have been constituted at the state level, governing bodies at the district level and block technical teams at the block level for the implementation of the plan, monitoring and redressal of problems.

Aims & Objectives of the Scheme

The Scheme 'Support to State Extension Programmes for Extension Reforms' aims at making extension system farmer driven and farmer accountable by disseminating technology to farmers through new institutional arrangements ATMA at district level to operationalize the extension reforms on a participatory mode.

Ensuring an integrated, broad-based extension delivery mechanism consistent with farming system approach with a focus on bottom up planning process.

Adopting group approach to extension in line with the identified needs and requirements of the farmers in the



Dr Dinesh Kumar

form of CIGs & FIGs and consolidate them as FPO.

Facilitating convergence of farmer centric programmes in planning, execution and implementation.

Addressing gender concerns by mobilizing farm women into groups and providing training to them.

Encouraging multi-agency extension strategies involving Public/Private Extension Service Providers.

Farmer Training Program - Farmers are given latest technical information about agriculture and agriculture related fields. So far, 297 inter-state / intra-state / intra-district trainings have been conducted, in which 25941 farmers participated, in which 17114 male and 8827 female farmers





information related to agriculture to the farmers. So far 6 Agricultural Scientific Interactions were organized in which 140 men and 40 women were participated by a total of 180 farmers.

□ Field Day/Kisan Goshti- Farmers are given field visits at different levels from sowing to harvesting. 134 Kisan Goshtis/Field Days were organized in which 4055 male and 2323 female farmers were participated by 6378 farmers

□ Farm School - 272 Farm Schools have been established/ established, through which new technologies are disseminated to the farmers by organizing frontline demonstrations on the farm of the founder farmer, where 6 days training is provided to a group of 30 farmers. is done

Farmer Awards

The best progressive farmers are given “Kisan Samman and Award” every year under various enterprises/sectors. For this, the farmer is selected on the basis of the excellent work done by the farmer in different areas. This award is given at three levels.

The award is given for the use of new varieties and techniques in the field of agriculture, increasing production and productivity and successful marketing of the product. Along with this, it is also seen that what work has been done by these farmers to promote it among other farmers and to make it popular. Under this scheme, the rewarded/reputed farmer at any one level in one enterprise is not selected for the same level award/honor in the same enterprise in the second year.

1- State level honor / award - The amount of each award has been kept at Rs.50,000.00. The selected farmer is awarded by the Honorable Chief Minister or Departmental Minister. Selected farmers are honored with the title “Kisan Ratna”.

2- District level honours/awards-The amount of this award has been kept at Rs 25,000.00. The rewarded Krishak is

participated.

□ Demonstration- Crop demonstrations of improved species are organized on agricultural fields by technical personnel. So far 8046 demonstrations have been organized, out of which 5000 crop demonstrations were organized by the Agriculture Department and 3046 by the Line Departments.

□ Farmer Exposure Visit Program - To enable the farmers to have the latest practical information about the programs run in the agricultural sector, visits are made to agricultural universities, advanced agricultural fields, research institutes etc. So far, 110 inter-state / intra-state / intra-district farmers tour programs have been conducted, in which 9283 farmers participated, 4762 male and 2159 female farmers participated.

□ Farmer Group Capacity Development- Farmer groups are

formed and their capacity is developed so that they can do their own production, training and marketing work related to agriculture, which can improve their livelihood. Capacity development of 652 farmer groups of different enterprises was done towards the strengthening of farmer groups.

□ Kissan Mela - Kisan fairs are organized at different levels, in which farmers get technical training as well as an opportunity to sell their products. So far 13 Kissan Melas have been organized in which 4908 farmers have participated. 2888 male farmers and 2020 female farmers participated.

□ Farmer Scientist Interactions- A interaction is organized between farmers and agricultural scientists by doing farmers. In these interactions, agricultural scientists also give technical



honored with the title "Kisan Bhushan".

3- Block level honor/award- The amount of this award has been kept at Rs.10,000.00. The rewarded Krishak is honored with the title "Kisan Shri".

Innovative Activities under ATMA scheme-

Mobile Agri-Clinic in District Almora

1. Mobile Agriclinic started on 4 Oct 2018

2. Mobile Agriclinic was launched in District Almora, Uttarakhand to Provide all the help and guidance needed for farmers at their doorsteps.

3. Various Departments like Agriculture, Horticulture, Animal Husbandry, Fisheries, ILSP & sericulture jointly involved in this program.

4. KVK Matella & VPKAS Institute also supported mobile agriclinic by providing Scientific & technical knowledge to farmers.

5. Till date near about 43000 farmers are benefitted by this mobile



agriclinic.

6. Many inputs like seeds, pesticides, mechanization scheme

related pamphlets provide to farmers via this mobile agriclinic. Many fruiting & flowering plants are also provided to farmers & vaccination of animals also done by veterinary department with the help of this mobile agriclinic.

7. Through mobile vans, advanced seeds, fruit-plants, agricultural and horticultural equipment, agricultural defense chemicals, veterinary vaccination, animal medicines and are being distributed by operating the van according to the route chart in the remotest areas of the district.

8. At the same time, dissemination of programs run by different departments in the interest of farmers.

Results after Implementation of Mobile Agri-Clinic

1. Through the scheme, even the remotest farmers are getting the benefits of getting information about departmental schemes.

2. Agriculture Department - Improved species seeds, agricultural inputs, agricultural machinery, agricultural defense chemicals and propagation materials.

3. Horticulture department - fruit plant distribution, growing species, vegetable and spice seed distribution, horticulture equipment and propagation material.

4. Animal Husbandry Department - Publicity material related to vaccination, distribution of animal medicines and animal feed and departmental schemes.

5. Fisheries Department - Publicity material related to fish seed distribution and departmental schemes.

6. Publicity material related to silk department-mulberry plant distribution and departmental schemes.

7. At the same time, information is being received about programs run by various departments in the interest of farmers.

8. The dependence of farmers on agricultural investment centres, animal health centres, horticulture centers etc. for departmental facilities has reduced considerably. Due to which their time, money and labor have been saved.

UTTARAKHAND

Best Horticulture State Award



GIR DIARY FARM

A UNIQUE DAIRY FARM AT ROORKEE THAT FOCUSES QUALITY AND ALSO BREED IMPROVEMENT

We at Gir Dairy Farming are operating a dairy farm with 100% indigenous breed of Gir and Badri cows at Roorkee, Haridwar district, Uttarakhand.

We are developing our dairy farm with a vision to preserve and conserve the desi Indian cows with higher natural immunity and minimal use of any external medicines. We also use and promote the concept of mating by the bull of the same breed in order to provide natural satisfaction to the animal by promoting natural breeding process.

At present we have a herd of 80 animals at our farm. Our herd includes 33 Gir and 7 Badri cows and their calves.

The cow shed design is designed and developed as per global standards to allow a balanced inflow of natural sunlight and air circulation to provide the best comfort to the animals.

Cow milk and ghee holds a special place in the Ayurvedic tradition. Along with its smooth buttery taste, consistency and golden colour, cow ghee has

We develop natural grazing fields of green fodder, variety of grasses and medicinal plants for creating a native environment for cows and calves which keeps them healthy

countless special uses and benefits. Uncooked ghee is known to contain healthy saturated fats, unsaturated fats and cholesterol which are good for health. Rich in vitamin K12, it helps in balancing the cardiovascular system while boosting the immunity of body to fight all ailments in our daily lifestyle and current living environment.

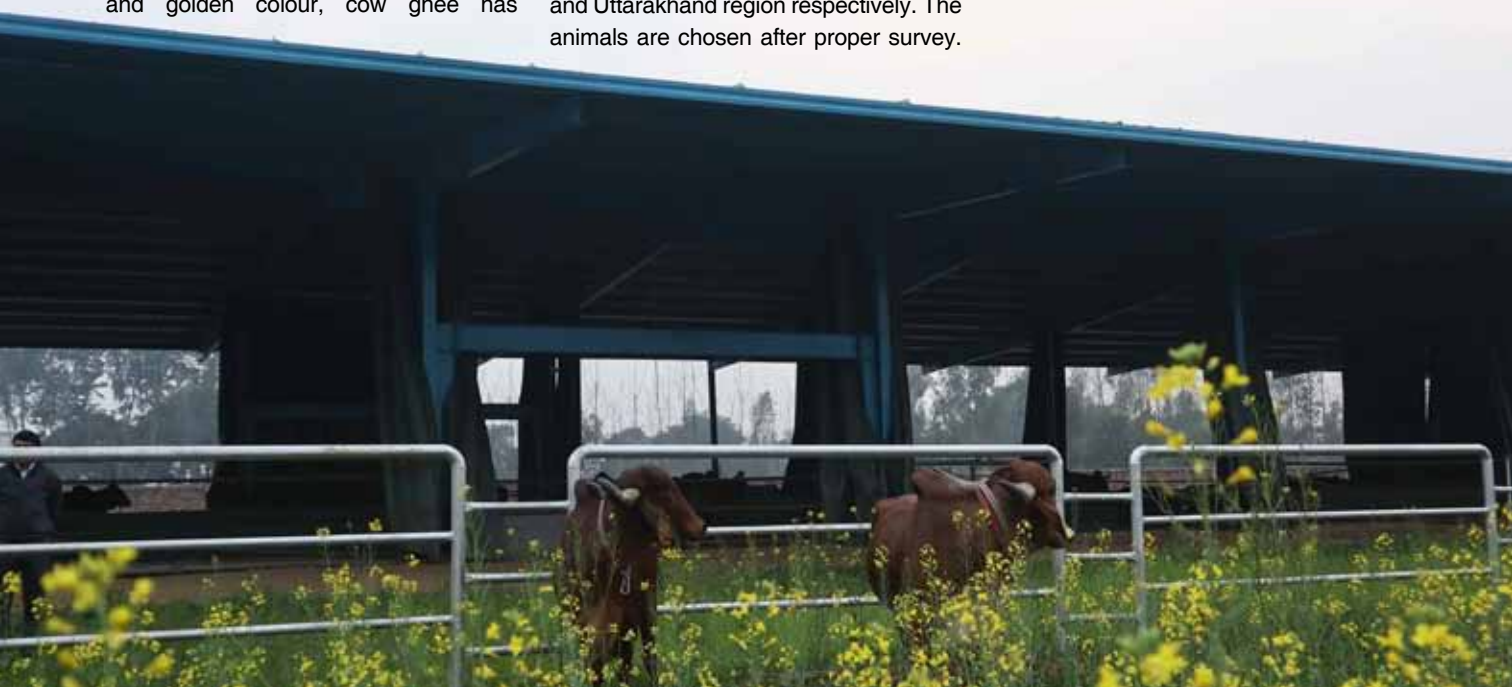
Salient Features Of Gir Dairy Farm

* Fully integrated farm of single desi cow breeds, Gir and Badri. These cow breeds are specific to the Gujarat region and Uttarakhand region respectively. The animals are chosen after proper survey.



Binu Shukla

Director, Gir Dairy Farming Products Pvt Ltd, Roorkee, Uttarakhand



Selection is done in consultation with experts in the animal husbandry field to get the best breeds.

* Regarding the climatic conditions, we have developed state of the art cow shed with proper air ventilation. It is equipped with curtains to save the animals from cold during winter season and also provide ample space for movement of animals for natural grazing and comfort.

* Our farm is managed with proper guidance and visits of veterinarians to take best care of animals. We work with proper guidelines set by the animal husbandry experts.

* We are trying to develop the best possible breed of Gir and Badri cows in Uttarakhand. Our objective is to increase the availability of these indigenous breeds for other farmers / dairy farms and to increase the use of A2 milk in our society.

We are selling fresh Gir cow milk at Rs 120 per litre and Gir cow ghee at Rs 3600 per kg.

Badri cow milk is sold at Rs 200 per litre and ghee at Rs 9000 per kg.

We are also engaged in the export of ghee of both cow breeds to Singapore under the Yantra brand. We are exploring more options to promote our ghee.

Breed Improvement

We are promoting Badri cow breed at our farm. This breed has high natural immunity and is less prone to common diseases. The breed has minimal exposure to medicines. It has traditionally been cared for by the use of medicinal plants in hills. The milk quality is very good and highly recommended for human consumption.

Going by our experience and analysis, the potential of increasing milk yield of Badri cow is huge. We are searching for a good pedigree bull (with high yield milk record of his mother) in Uttarakhand at any cost in order to achieve our goal of producing healthy offspring of Badri cow breed.

We are also developing bulls of good pedigree on our dairy farm for



natural breeding to avoid the artificial insemination process. We feel that the AI process deprives the animals of natural pleasure. Through natural mating, the animal is able to avoid unwanted infections that may be caused by the AI process.

* We are taking all possible steps to save water. We have installed rain water harvesting model at our dairy farm.

* We use green fodder grown at our farm by using organic waste, cow dung and cow urine as natural fertilizers to avoid the use of harmful chemicals used as crop boosters.

* We develop natural grazing fields of green fodder, variety of grasses and medicinal plants for creating a native environment for cows and calves which keeps them healthy. We always try to keep our cattle close to nature as much as possible.

* We believe that the calf has

the first right on cow's milk. So we give proper share of milk to the calves to keep the mother and baby happy.

* We prefer natural milking, keeping focus on maintaining good hygiene.

* We are developing good seeds for crops, vegetables and fruits for value addition along with dairy activities.

* We plan to provide cow urine and dung from our farm to interested farmers for organic farming to minimize the use of harmful chemicals being used by most farmers.

* We are currently supplying farm fresh A2 cow milk, desi ghee made with traditional boliona method and butter milk.

* We always try to maintain a proper balance between nature and our dairy farm activities and make our dairy farm as a self sustained entity for long term progress.

SUCCESS STORY IN FISH FARMING

NEPAL SINGH SCRIPTS SUCCESS

In a state where people claim fate is more important for success, the success story of a veteran farmer from Thithki Quadpur an interior village of Haridwar district is a shining example of how technologically sound innovative cultivation methods can transform the agrarian economy and uplift the lives of millions of farmers.

It has been an incredible journey for Nepal Singh who was unemployed and was working as a daily wage labour. In 2004, he entered the world of fisheries and allied activities when a village society pond of 5.50 hectares was awarded to him on lease.

Realising the benefits of working in a group, Nepal Singh gradually formed a self-help group in 2005. Thereafter in 2006, he formed a Primary Fisheries Cooperative Society to carry out the farming works effectively. His dedication, perseverance and hard work helped him bag the progressive farmer award given by Gujarat in 2012-13, for which he received a cash prize of Rs 51,000.

Nepal Singh had emerged as a role model in the district. He has been instrumental in encouraging the fishermen community to pursue aqua farming. He



NEPAL SINGH

Besides fisheries, Nepal Singh is also engaged in agriculture and horticulture. He has grown papaya, amla, banana along the dykes of the pond which provide extra income. He has also practiced sericulture, poultry, duck farming which have further added to his net profit from the farm

motivated the fishermen community and helped in the formation of nine fisheries cooperative societies by 2009. At present there are 32 fisheries cooperatives in Haridwar district. Nepal Singh also formed a district level federation in 2015-16.

Vital Support Of Department

“This could not have been possible without the support, service, technical help and motivation from the State Fisheries Department,” says Nepal. He was benefitted by the Fisheries Department Haridwar in 2007-08 when he received subsidy for the renovation of his pond. The department also helped him in providing fish seed from government fish seed hatchery, Kashipur Udham Singh Nagar. These are raised to a certain point in his ponds and are then sold to retailers and wholesalers.

In the beginning he was not sure about the tools and techniques for fish farming except some traditional ways. His interest in fish farming helped him to cope with the growing trends in this sector. The local agriculture agency ATMA also helped with in various ways to set up his farming. He availed loans from the



COLLECTION OF FISH FROM COOPERATIVE PONDS IN DISTRICT HARIDWAR



ESTABLISHED GROWT CENTRE AT POND SITE



SECRETARY FISHERIES, GOVT. OF UTTARAKHAND WHILE INSPECTION OF NEPAL SINGH POND

banks and strengthened his farming with modern technologies.

Multi-Faceted Farmer

Besides fisheries, Nepal Singh is also engaged in agriculture and horticulture. He has grown papaya, amla, banana along the dykes of the pond which provide an extra source of income. He has also practiced sericulture, poultry, duck farming which have further added to his net profit from the farm.

Nepal Singh says that he never compromises with the norms for quality and quantity of his farming throughout the year, which is the key factor for his success. As fresh fish are in high demand, marketing is not a problem for him. The fish varieties cultured by him include catla, rohu, mrigal. Later he also started farming grass carp, silver carp, common carp, big head, etc.

In 2020, schemes worth more than Rs 70 crore have been sanctioned under NCDC funded programme which are being administered through the district level federation. This program helped him to introduce pangasius fish in his pond and establish a duck hatchery through which he is making ducklings available to the



INTEGRATED FISH FARMING (DUCKLINGS)

A Role Model

Nepal Singh is a highly successful fisheries entrepreneur, and a community role model. Local agencies, KVKs, farmers and other allied departments organize demonstration program at his model fish farm. He has promoted the concept of using quality fish seeds, use of advanced fingerlings, integrated fish farming, use of probiotics and pelleted fish feed based on his experiences and the training that he had received from the Fisheries Department.

fish farmers in the state.

Along with this, he has shifted from traditional feeding of rice bran and oil cake to fishes to pelleted feed. Probiotics are also added to improve the fish

gut fauna for digestion. Quality feed is given scientifically as advised by the department officials. His last year earnings from fish culture and allied activities were nearly Rs 8 lakh as net profit.

