Unnat Bharat Abhiyan, IIT Delhi

UBA Interventions Impact Study
Gaindikhata Cluster

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Introduction

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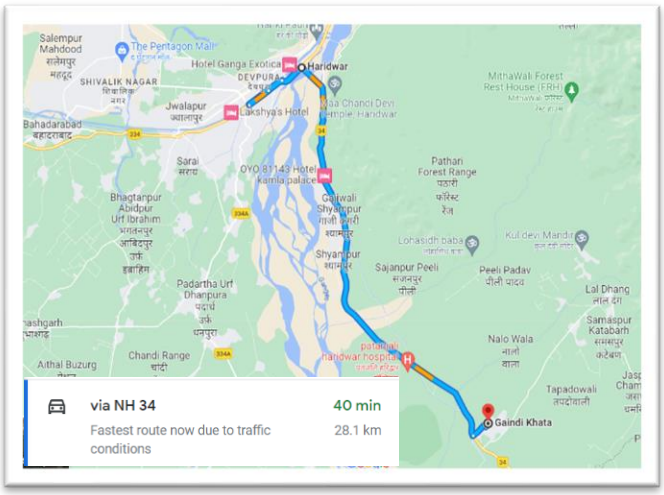
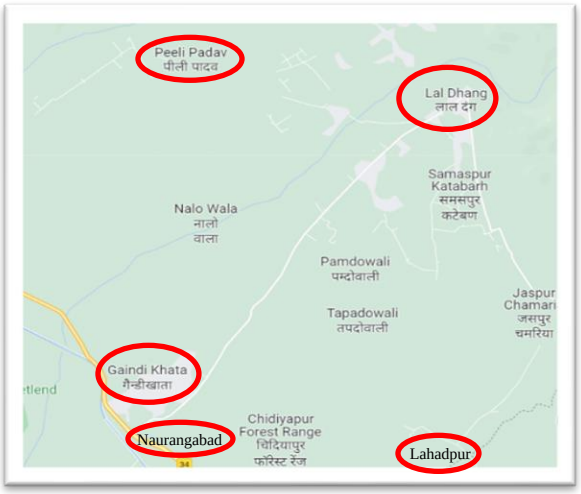
1. THE CLUSTER

1.1 Introduction to the cluster

- **Demographics**: Gaindikhata is a rural village located in the Haridwar district of Uttarakhand, India. It is home to a diverse community comprising individuals from various socio-economic backgrounds, castes, and religions. Gaindikhata cluster includes Gaindikhata, Naurangabad, Lahadpur, Peeli Padav and Laal Dhaang. The other 4 villages are located nearby Gaindikhata. The villages are situated approximately 25-30 km from Haridwar, and they are well-connected to Haridwar by road, with frequent bus services available.





❖ **Census Data:**

Name of the Village	No. of Households	Total Males	Total Females	Total Population
Gaindikhata	549	1447	1370	2817
Peeli Padav	267	905	900	1805
Laal Dhaang	1214	3574	3322	6896
Naurangabad	87	230	180	410
Lahadpur	103	280	261	541

Source: *https://censusindia.gov.in/census.website/data/population-finder*

❖ **Gram Panchayat Data:**

Name of the Village	Gram Panchayat	Gram Pradhan
Gaindikhata	Gaindikhata	Mrs. Bismillaha
Peeli Padav	Peeli Padav	Mr. Shashi Jhandwal
Laal Dhaang	Laal Dhaang	Mr. Dinesh Karnwal
Naurangabad	Gaindikhata	Mr. Bismillaha
Lahadpur	Lahadpur	Mrs. Rubi Saini

- **Geographical Features**: The villages are situated in Chidiyapur forest range of Rajaji National Park, known for its natural beauty, with lush green landscapes, agricultural fields, and proximity to the Ganges River. The terrain is predominantly hilly and characterized by a subtropical climate.

- **Agricultural and livelihood Practices**: Agriculture is a primary occupation in Gaindikhata cluster. The region is known for the cultivation of various crops, including paddy, wheat, maize, pulses, oilseeds, and vegetables. Lemongrass, mushroom cultivation, azolla farming, organic farming, beekeeping, polyhouse technology, etc are on a leading edge in the cluster. Farming practices range from traditional to modern techniques, with an increasing focus on sustainable agriculture. Also, there are many challenges faced by farmers which need to be addressed. Alongside agriculture, livestock rearing is a common practice in the cluster. Farmers rear cattle, goats, and poultry for milk, meat, and other dairy products, contributing to the local economy and livelihoods. Dairy businesses are backbone of local economy and dairy related activities are practiced by many families at the cluster.

- **Infrastructure**: Cluster's infrastructure may vary in terms of accessibility and development. The villages typically have basic amenities such as schools, healthcare centers, community spaces, and local markets. However, there are challenges related to the quality and availability of infrastructure in some areas. For example, the area doesn't have a quality hospital for emergencies, We need to go to Haridwar for good quality primary treatment, which may be fatal due to the busy road conditions nowadays.

- **Education**: Education is an important aspect of the community's development. The cluster likely has primary and secondary schools within the villages or in nearby areas. The literacy rate and educational facilities may vary, with efforts often underway to improve access to quality education. The model degree college is under construction which shows the educational development of the area.

Various livelihood and agricultural practices at Gaindikhata cluster villages (Azolla farming, Beekeeping, and Polyhouse technology)

Model Degree College (Under Construction)

Open Air Theatre, Model degree college

Saraswati Shishu Vidya Mandir School, Gaindikhata

1.2 UBA and its interventions

As a part of UBA, IIT Delhi has been working for the holistic and sustainable development of the Gaindikhata cluster since 2017 in collaboration with Surabhi Foundation. UBA had identified many potential threats through hamlet meetings, village surveys, household surveys, community meetings, etc. UBA has been continuously working on these threats leading a way for sustainable development by introducing some interventions. Some of these interventions are:

- ✓ Polyhouse Technology
- ✓ Mushroom Cultivation
- ✓ Smokeless cookstove/kitchen
- ✓ Lemongrass cultivation
- ✓ Organic cultivation
- ✓ Beekeeping/Honey Production
- ✓ School Education and Model Degree College
- ✓ Health Camps
- ✓ Azolla Farming
- ✓ Awareness Programs
- ✓ SHG Formation

UBA is collectively working with various departments and organizations to resonate their efforts and achieve the sustainability goal soon. Some of these organizations are:

- Surabhi Foundation
- Department of Science and Technology, New Delhi
- ONGC (CSR)
- District Administration, Haridwar
- Krishi Vikas Kendra, Haridwar
- Bahadrabad Block Administration
- Horticulture Department, Uttarakhand
- Cooperative Department, Uttarakhand
- Education Department, Uttarakhand
- Gram Panchayats
- Krishnayan Gaushala

The overall objective is to create a model for rural development that can be replicated in other similar regions. By leveraging the knowledge and resources available at IIT Delhi, the initiative seeks to empower rural communities, foster sustainable growth, and bridge the gap between rural and urban areas in terms of opportunities and access to resources. Through the Unnat Bharat Abhiyan and the Gaindikhata Cluster, IIT Delhi demonstrates its commitment to social responsibility and inclusive development by actively engaging with rural communities and contributing to their holistic progress.

1.3 About this study

Under the guidance of Prof. Vivek Kumar and support of Mr. Chakrabhushan Pandey, we conducted household surveys and interacted with different people of villages. The surveys and interactions mean to meet various objectives which are as follows:

- To study the UBA intervention and its impact on people.
- To interact with various farmers, study their livelihoods, challenges, and effect of UBA interventions on their livelihoods.
- To interact with Gram Pradhans, and study the functioning, challenges faced by Panchayats in village development.
- To interact with SHG members and study the impact and challenges of SHGs on their livelihoods.
- To know how Naurangabad CNG plant support local farmers in organic farming.
- To visit various schools and interact with teachers and students.
- To study the resources available in the cluster and analyze them for their sustainable and effective use in future.

Household Survey, Peeli Padav

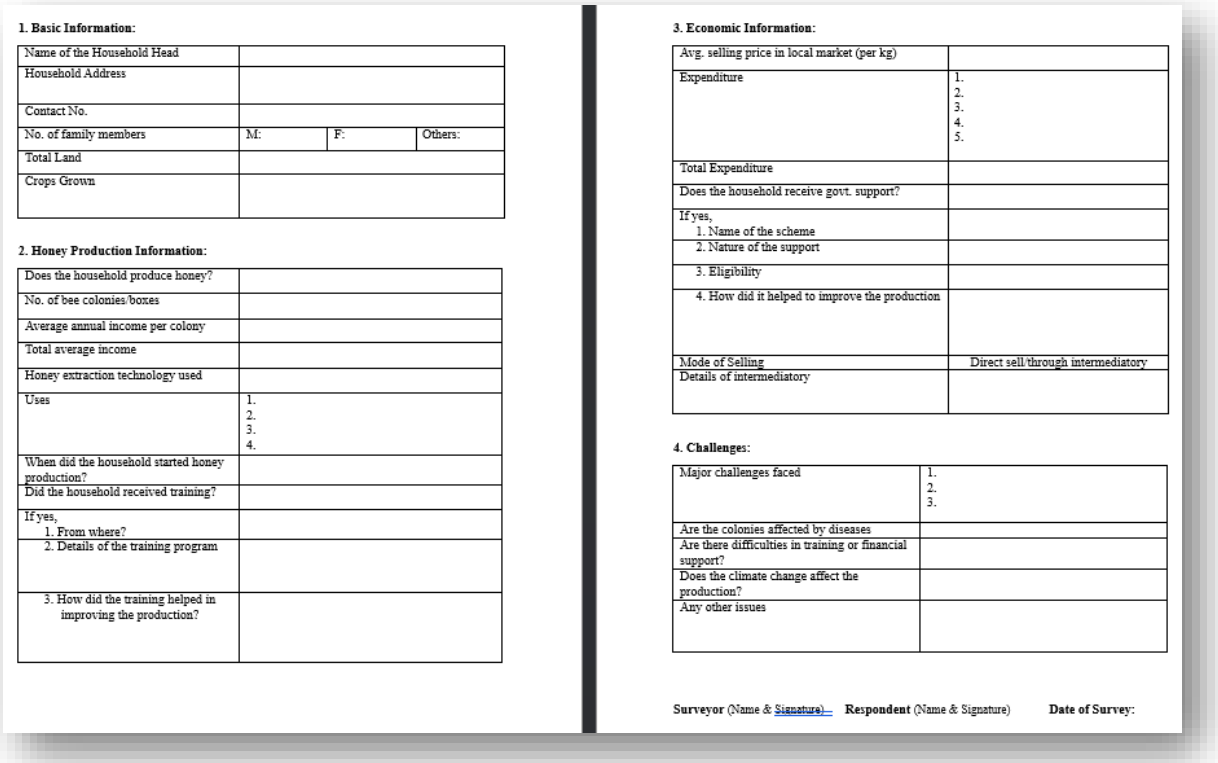
Household Survey, Lahadpur

2. METHODOLOGY

The methodology employed in this project report involved a mixed-methods approach, combining qualitative and quantitative data collection and analysis techniques. The study majorly involves qualitative data. This comprehensive approach allowed for a thorough assessment of the impact of Unnat Bharat Abhiyan interventions in the Gaindikhata cluster, Haridwar. Some of the major aspects of assessment are as follows:

A. Sampling: The study objectives mentioned above states that the samples for the study are farmers, villagers, or local communities, SHGs, govt. school teachers, students, Gram Pradhans, etc. The farmers who are the primary stakeholders of lemongrass cultivation, organic cultivation, polyhouse, and other interventions are the main focus of the study.

B. Data collection: The impact assessment of the intervention requires input from the beneficiaries. The input data was collected through household surveys, direct interaction with villagers, meetings with Gram Pradhans, teachers, and informative session with students. These methods are very efficient for the study purpose as it includes direct interaction with the beneficiaries that helps to understand their livelihoods, socio-economic status, awareness, and challenges. For conducting the surveys, we prepared the questionnaire in the form of survey forms. For e.g.-



1. Basic Information:

Name of the Household Head			
Household Address			
Contact No.			
No. of family members	M:	F:	Others:
Total Land			
Crops Grown			

2. Honey Production Information:

Does the household produce honey?	
No. of bee colonies/boxes	
Average annual income per colony	
Total average income	
Honey extraction technology used	
Uses	1. 2. 3. 4.
When did the household started honey production?	
Did the household received training?	
If yes, 1. From where?	
2. Details of the training program	
3. How did the training helped in improving the production?	

3. Economic Information:

Avg. selling price in local market (per kg)	
Expenditure	1. 2. 3. 4. 5.
Total Expenditure	
Does the household receive govt. support?	
If yes, 1. Name of the scheme	
2. Nature of the support	
3. Eligibility	
4. How did it helped to improve the production	
Mode of Selling	Direct sell/through intermediatory
Details of intermediatory	

4. Challenges:

Major challenges faced	1. 2. 3.
Are the colonies affected by diseases	
Are there difficulties in training or financial support?	
Does the climate change affect the production?	
Any other issues	

Surveyor (Name & Signature) **Respondent** (Name & Signature) **Date of Survey:**

C. Data Analysis: After successfully completion of surveys, interactions, meetings, and informative sessions, we organised the collected data and listed all the important facts, findings, observations, and challenges as per the progress status of each intervention of Unnat Bharat Abhiyan, IIT Delhi. We had analysed the recorded observation at the cluster regardless of the surveys and interactions, for e.g- natural resources, energy sources, healthcare facilities, etc. Overall, the robust and inclusive methodology employed in this project report ensured a comprehensive and nuanced assessment of the impact of Unnat Bharat Abhiyan interventions, providing valuable insights into the effectiveness and implications of the implemented initiatives in the Gaindikhata cluster.

Lemongrass field survey at Peeli Padav

Useful free digital study resources demonstration at Govt. school, Peeli Padav

CNG plant visit at Naurangabad

3. IMPACT ANALYSIS

3.1 Polyhouse Technology

- **Introduction:**

  Polyhouse technology, also known as greenhouse farming, is gaining popularity in India. Its structure is made of galvanized iron covered by UV stabilized polyethylene sheet. It involves cultivating crops in controlled environments, providing optimal conditions for growth and protection from adverse weather and pests. It helps farmers extend the growing season, conserve water, maximize land utilization, and cultivate high-value crops, contributing to increased productivity and profitability. Government support and subsidies have further encouraged its adoption and diversification of agricultural practices.

  In the first stage, five farmers from four villages were given poly and green houses in the year of 2019 through Pandit Dindayal Upadhyay Gram Sankul Pariyojna, which was very beneficial for farmers after three years of this project. Then, the Surabhi Foundation took initiative in convergence with Horticulture Department, Uttarakhand and 120 polyhouses of 100 m^2 each were built for farmers at Gaindikhata cluster in February 2023. The UBA team also conducted exposure visits to farmers for spreading awareness and better utilization of polyhouse technology for a better livelihood.

Polyhouses at Gaindikhata cluster

- **Impact and Current Status:**

Unnat Bharat Abhiyan's installation of polyhouses for farmers at the Gaindikhata cluster has had a positive impact. The introduction of polyhouses has provided several benefits to the farmers in the area. Firstly, polyhouses have helped in extending the growing season, allowing farmers to cultivate crops in any season, irrespective of the external weather conditions. This has increased the overall productivity and income potential for the farmers. Secondly, polyhouses provide protection from adverse weather conditions, such as heavy rains, storms, and extreme temperatures. This safeguarding helps in minimizing crop losses and ensuring a stable and consistent yield. Thirdly, the controlled environment inside polyhouses enables better management of irrigation and water usage. Farmers can optimize water supply to the plants, reduce water wastage, and conserve this precious resource. Lastly, polyhouses facilitate the cultivation of high-value and high-demand crops, including exotic vegetables, flowers, and nursery plants. This diversification allows farmers to tap into niche markets, earn higher profits, and improve their livelihoods.

Overall, the installation of polyhouses by Unnat Bharat Abhiyan at the Gaindikhata cluster has empowered small-scale farmers by providing them with a sustainable and efficient means of agriculture. It has enhanced their productivity, income, and resilience to climatic uncertainties, ultimately contributing to their socio-economic development. After interaction with the farmers, their current status is described below:

- Current crops/vegetables grown in polyhouses – Brinjal, Capsicum, Tomato, Ladyfinger, Bottle gourd, cucumber, Green Coriander, Pumpkin, etc.

Current crops in polyhouses at Peeli Padav

- Most of the farmers use traditional irrigation techniques while very few of them use sprinkler systems and drip irrigation.
- Almost all farmers use natural cow dung and organic manure as fertilizers for their crops.
- Farmers chose to use this technology as it provides protection against adverse weather conditions like heavy rainfall, extensive hot and cold, pests, diseases, etc.
- Overall expenditure involves mainly irrigation costs, seeds, pesticides, and fertilizers.

- Polyhouse produce is mainly used for household purposes only, if the produce is surplus, farmers sell it in local market, or to villagers. Most of the farmers are yet to get their first produce, so they are not sure about the use of the produce.
- As far as govt. support is concerned, some farmers received training and awareness from exposure visits conducted by UBA, some got information from UBA team members and some from peer groups. Initially, some farmers received support from the Horticulture department, UK in the form of seeds and pesticides, but the ground level scenario is something different mentioned below.

Interaction with farmers at Gaindikhata cluster

List of the current stakeholders of polyhouse:

S.No	Name of farmer	Father/Husband Name	Address	Category	Mobile No.	Scheme	Unit	Area(m^2)
1	Satram Singh	Prabhu Ram	Peeli Padav	OBC	9720631792	HMNEH	1	100
2	Tarsem	Garibu	Peeli Padav	OBC	6398538677	HMNEH	1	100
3	Jagdish Singh	Bihari Singh	Peeli Padav	OBC		HMNEH	1	100
4	Rajash Kumar	Diwanchand	Peeli Padav	OBC	7983735617	HMNEH	1	100
5	Mohanlal	Amar Singh	Peeli Padav	OBC		HMNEH	1	100
6	Gurumel	Ram	Peeli Padav	OBC	9528813554	HMNEH	1	100
7	Jagdish Singh	Mastram	Peeli Padav	OBC		HMNEH	1	100
8	Gurcharan	Veer Singh	Peeli Padav	OBC	9719146357	HMNEH	1	100
9	Budhram	Gurudutta	Peeli Padav	OBC	9917149750	HMNEH	1	100
10	Ashok Kumar	Ram Dayal	Peeli Padav	OBC		HMNEH	1	100
11	Sharda	R. Shankar	Peeli Padav	OBC		HMNEH	1	100
12	Fumman	Sukhram	Peeli Padav	OBC		HMNEH	1	100
13	Sohanlal	Chitram	Peeli Padav	OBC		HMNEH	1	100
14	Takam Ram	Nanakchand	Dudhala Dayalwala	OBC		HMNEH	1	100
15	Manguram	Sukhram	Peeli Padav	OBC		HMNEH	1	100
16	Suraj Singh	Tilakraj	Peeli Padav	OBC	9027371443	HMNEH	1	100
17	Vinod	Shrawan Singh	Peeli Padav	OBC		HMNEH	1	100
18	Galkeet Singh	Chetram	Peeli Padav	OBC		HMNEH	1	100
19	Shyam Lal	Paras Ram	Peeli Padav	OBC		HMNEH	1	100
20	Prem Singh	Bishan Singh	Taatwala	OBC		HMNEH	1	100
21	Yashpal Singh	Bihari Singh	Taatwala	OBC		HMNEH	1	100
22	Jagdish Singh	Dhaniram	Taatwala	OBC		HMNEH	1	100
23	Baldev Singh	Bihari Singh	Taatwala	OBC		HMNEH	1	100
24	Rishipal	Ghasita	Taatwala	OBC		HMNEH	1	100
25	Jaipal Singh	Prakash Singh	Taatwala	OBC	9411342576	HMNEH	1	100
26	Ramesh Singh	Melaram	Taatwala	OBC	9758130415	HMNEH	1	100
27	Chhote	Chhaju	Chidiyapur	OBC		HMNEH	1	100
28	Naresh	Sukhlal	Naurangabad	OBC		HMNEH	1	100
29	Jaipal		Naurangabad	OBC		HMNEH	1	100
30	Rishipal		Naurangabad	OBC		HMNEH	1	100
31	Kewal Singh	Chunni Singh	Naurangabad	OBC	9412956074	HMNEH	1	100
32	Raghuveer Singh		Chidiyapur	OBC	8533013781	HMNEH	1	100
33	Vinod Kumar	Chunni Singh	Naurangabad	OBC		HMNEH	1	100
34	Sandeep	Pyarelal	Naya Gaon	GEN		HMNEH	1	100
35	Kheg Singh	Ramswaroop	Naya Gaon	GEN		HMNEH	1	100
36	Mukesh Negi	Vijay Singh	Naya Gaon	GEN		HMNEH	1	100
37	Sattu Singh	Chiman Singh	Naya Gaon	GEN	8476857850	HMNEH	1	100
38	Alam Singh Rawat	Govind Singh Rawat	Naya Gaon	GEN		HMNEH	1	100
39	Sandeep Singh Rawat	Vinod Singh Rawat	Naya Gaon	GEN		HMNEH	1	100
40	Ratan	Birwa	Naya Gaon	GEN	9897762116	HMNEH	1	100
41	Tejpal	Bhagat Singh	Naya Gaon	GEN		HMNEH	1	100

42	Mohini Devi	Vinod Singh Rawat	Naya Gaon	GEN		HMNEH	1	100
43	Jaipal	Veer Singh	Dudhala Dayalwala	OBC		HMNEH	1	100
44	Gaurav Singh	Chand Singh	Meethi Beri	OBC		HMNEH	1	100
45	Gopal Singh	Sukhram	Meethi Beri	OBC		HMNEH	1	100
46	Narayan Singh	Diwan Singh	Rasoolpur	GEN		HMNEH	1	100
47	Melaram Singh	Siguram	Dudhala Dayalwala	OBC		HMNEH	1	100
48	Rajendra	Ramkishan	Peeli Padav	OBC		HMNEH	1	100
49	Krishna Kumar	Veer Singh	Peeli Padav	OBC		HMNEH	1	100
50	Surendra Kumar	Sitaram	Peeli Padav	OBC		HMNEH	1	100
51	Harkesh Ram	Mangal Singh	Peeli Padav	OBC		HMNEH	1	100
52	Lekhraj		Peeli Padav	OBC		HMNEH	1	100
53	Shanti Prasad	Ishwari Dutta	Gaindikhata	GEN		HMNEH	1	100
54	Shripal	Kunwar Singh	Laldhang	GEN		HMNEH	1	100
55	Teg Singh	Ramchandra	Laldhang	GEN		HMNEH	1	100
56	Suresh Chandra	Keshvdutta	Rasoolpur	GEN	9761174902	HMNEH	1	100
57	Phoolchandra	Sukhlal	Magolpura	OBC		HMNEH	1	100
58	Alok Kumar	Satyaprakash	Laldhang	GEN		HMNEH	1	100
59	Jairaj Singh	Kallu Singh	Gajiwali	OBC	9719969826	HMNEH	1	100
60	Gaurav Sharma	Ramprakash	Kangri	GEN	9634704383	HMNEH	1	100
61	Dilawar	Balveer Singh	Shyampur	GEN		HMNEH	1	100
62	Ajeet	Chhawan Singh	Shyampur	GEN	8192846625	HMNEH	1	100
63	Anil Kumar	Chandrabhan	Sajanpur Peeli	GEN		HMNEH	1	100
64	Karan Singh	Jyoti Prasad	Sajanpur Peeli	GEN	9817189688	HMNEH	1	100
65	Naresh Kumar	Balveer Singh	Shyampur	GEN		HMNEH	1	100
66	Kavita	Pitambar	Sajanpur Peeli	GEN	8476022590	HMNEH	1	100
67	Ramprakash Sharma	Shaligram Sharma	Kangri	GEN	9412911870	HMNEH	1	100
68	Kusum	Shyamlal	Lahadpur	OBC	9548068913	HMNEH	1	100
69	Brijpal	Dayaram	Lahadpur	OBC	9617538547	HMNEH	1	100
70	Kallu	Harnam	Lahadpur	OBC	7900251913	HMNEH	1	100
71	Vijaypal	Baburam	Lahadpur	OBC	7454839145	HMNEH	1	100
72	Rajpal	Harkesh	Lahadpur	OBC	9927741217	HMNEH	1	100
73	Mayaram	Dalu	Lahadpur	OBC	9917184385	HMNEH	1	100
74	Balveer Singh	Kaur Singh	Peeli Padav	OBC		HMNEH	1	100
75	Rajpal	Harkesh	Lahadpur	OBC	9927741217	HMNEH	1	100
76	Sitaram	Bhagat Singh	Lahadpur	OBC	9012474160	HMNEH	1	100
77	Preetam	Muriya	Lahadpur	OBC	9927474557	HMNEH	1	100
78	Rajpal	Bhudhha	Lahadpur	OBC	9927827648	HMNEH	1	100
79	Chhotan	Jahagir	Lahadpur	OBC	9193069837	HMNEH	1	100
80	Prakash	Ishwari	Lahadpur	OBC	9997965037	HMNEH	1	100
81	Baburam	Mangal Singh	Lahadpur	OBC	9837183949	HMNEH	1	100
82	Shamshad	Yusuf	Gaindikhata	OBC		HMNEH	1	100
83	Kailash	Hukum	Lahadpur	OBC	7579412821	HMNEH	1	100
84	Gopal Singh	Kalyan	Naya Gaon	OBC	8755414022	HMNEH	1	100
85	Munesh Singh	Babusingh	Naurangabad	OBC	8272821753	HMNEH	1	100
86	Virendra	Buddha	Lahadpur	OBC	7668604412	HMNEH	1	100

87	Jaipal	Murali	Lahadpur	OBC	9837141685	HMNEH	1	100
88	Prakashi	Dalpat	Lahadpur	OBC	9568911799	HMNEH	1	100
89	Manoj	Sukke	Lahadpur	OBC	8532900843	HMNEH	1	100
90	Baburam	Jahagir	Lahadpur	OBC	9411608285	HMNEH	1	100
91	Kewal	Jahagir	Lahadpur	OBC	9917703397	HMNEH	1	100
92	Rampal	Indra	Lahadpur	OBC	8055993655	HMNEH	1	100
93	Ghanshyam	Murali	Lahadpur	OBC	9756763081	HMNEH	1	100
94	Balram	Suresh	Lahadpur	OBC	9917024023	HMNEH	1	100
95	Rohtash	Hukum	Lahadpur	OBC	8937846129	HMNEH	1	100
96	Prem Singh	Moolchand	Lahadpur	OBC	9500074988	HMNEH	1	100
97	Sarabjit	Mahendra Singh	Dudhala Dayalwala	OBC	9411151249	HMNEH	1	100

- **Challenges faced by farmers:**

  The major challenges faced by farmers in using polyhouse technology are listed as follows:

  - Most of the farmers are using polyhouse technology, so a lack of information or awareness is seen among them about disease and pest management, irrigation, insects, etc.
  - Either due to lack of awareness or ground level mismanagement, farmers are not getting proper seeds and pesticides from the govt. timely, hence they buy from the market which affect their income and yield. Some farmers were using ash as fertilizer, which is very less efficient.
  - The pesticides and fertilizers used by farmers are unable to destroy the insects and diseases, causing less yield and low quality of crop.
  - Some farmers said that their polyhouses are less temperature efficient, and it affects the crops.
  - One of the most common problems is the damage caused by ***monkeys***. They tear the polyethylene sheets and eat the vegetables due to which it becomes necessary to replace the sheet.

Polyhouses torned by monkeys in Peeli Padav

Leaves damaged by insects

3.2 Mushroom Cultivation

- **Introduction**

  In July 2019, six farmers participated in the mushroom production training at Dehradun conducted by the convergence of Unnat Bharat Abhiyan and Food Processing Department, Uttarakhand. As a positive impact of the training, these farmers started mushroom cultivation in a small and clean room in their house with additional support provided by ONGC CSR in the form of mushroom compost, button mushroom spawns, plastic bags, etc. This intervention helped the farmers to increase their income at an increasing rate. Small scale farmers are also showing a positive response towards mushroom cultivation as it gives a continuous income throughout the season. After this intervention many new farmers started seasonal mushroom cultivation and two mushroom plants opened in the clusters which gives employment opportunity to more than eight women and men. As a result of this intervention and positive response from people, Mushroom was chosen for Haridwar under the ODOP (One District One Product) Scheme by district administration in 2020, and this was a major revolution in the era of mushroom cultivation as the farmers from whole district started cultivating mushroom and made the intervention successful not only at the cluster level but also at the district level.

Current mushroom production at a Farmhouse, Katebad, Laal Dhaang

- **Impact and Current status**

  The current market price of mushrooms is Rs. 110 per kg. Mushrooms need temperature of around 15-16 ^{o}C to grow, which is achievable only artificially in ongoing summer season. After interaction with farmers at farmhouses, the described crop cycle of mushroom is as follows-

  - Firstly, compost is made from *Bhusa* (straws), poultry manure, and Gypsum. It takes 3,4 days to completely prepare compost for mushrooms to grow. It is then saturated with water and further processing is done which takes 8,9 days in total. The farm at Laal dhaang contains 2500 bags in a room with 6 rooms in total. After pasteurizing the compost, the spawn run, airing, sterilization and other production process takes almost 36 days to convert a spawn to a full-grown mushroom. The maximum capacity they try to extract from one bag is 2.5 Kg. which is a good estimate for farmers to earn a good income. The other expenditure includes electricity, water supply, storage, etc.

- The farmhouse has almost 25-30 labours and 3-4 technical workers, i.e., it gives employment to 30-40 people in the village. The labour's salary is Rs. 300 per day. The local labours are learning new skills which will be beneficial for them in the future.

- Small scale farmers achieved 100-200 Rs. Per day in the mushroom growing season for three months recently, which had provided a good boost to their income. They sell their mushrooms to the local villagers and market.
- Despite the Covid outbreak recently, some farmers started the production of Oyster mushroom (AKA button mushroom) with support provided from UBA, ONGC CSR, New Delhi in the form of oyster spawns, plastic bags, etc. Famers said that they created compost with wheat straws and chemical bought from Haridwar Krishi Mandi. They were successful in boosting their income and other farmers were also motivated by them to start mushroom cultivation.
- Many landless farmers are currently working under the two big mushroom farmhouses at Laal Dhaang and Peeli padav, i.e., they have the proper skills, but they are unable to start their own local production centre due to high competition.

Mushroom farmhouse (exterior view and compost bunkers) at Katewad, Laal Dhaang

Various stages of mushroom crop in different optimized rooms at the farmhouse

Farmers working at the farmhouse, Laal Dhaang

- **Challenges**

  Some of the major challenges faced by farmers in growing mushroom are listed below:

  - Temperature, CO_2 level, fresh air, and hygiene maintenance are some key factors which affect the mushroom yield and quality. Despite major precautions, it is sometimes unable to maintain all the above factors, which decreases productivity.
  - Keeping in mind the above factors, the other major drawback is storage of the produce. A less optimum place for storage affects productivity.
  - Small and seasonal farmers are not able to compete for the selling price with mushroom plant owners.

Interaction with farmers cultivating mushrooms

Germ-killing chemicals for hygiene maintenance at room entrance at the farmhouse

3.3 Organic Cultivation

- **Introduction**

Organic farming has emerged as a sustainable alternative to conventional agriculture, prioritizing environmental health, biodiversity, and the well-being of farmers and consumers at Gaindikhata cluster. This section explores the principles, benefits, and challenges associated with organic farming, highlighting its potential to create a sustainable future for our planet. By employing natural techniques, organic farmers work in harmony with nature to promote ecological balance while maintaining agricultural productivity. This section delves into the key principles of organic farming, its environmental and health benefits, as well as the challenges faced by organic farmers. UBA had conducted training programs and capacity building programs for awareness of organic cultivation.
The local Krishnayan Gaushala constantly provides support to farmers in the form of organic manure, biogas slurry, cow dung prepared manure, etc. Overall, organic farming offers a promising pathway to a resilient and environmentally conscious agricultural system.

- **Impact and current status**

Since the excessive use of chemical fertilisers and pesticides was causing dangerous effects on environment in the form of soil pollution as well as the water pollution. These chemicals were poured directly to the Ganga River or through flow with the rain via fields. So, to reduce the flow chemical pesticides to Ganga and improve the soil fertility, Unnat Bharat Abhiyan started this initiative of organic farming in Gaindikhata cluster. For this, Unnat Bharat Abhiyan provided proper training of organic farming to the farmers of Gaindikhata cluster so that they can make organic fertilizers from cow dung with necessary equipment and also, they provided organic pesticides, fungicides and insecticides to the farmers. Also, Farmers can directly receive organic fertilizers from UBA, Co-operative society, Udyan Vibhag, CNG plant at Naurangabad, Cowsheds etc.

Vermicomposting bag provided to farmers

Organic pesticide used by farmers

Overall, The UBA Team worked very well to enhance the lifestyle of people of Gaindikhata Cluster. After interaction with the farmers, their current status is described below:

- Current crops/vegetables grown by farmers: Wheat, corn, rice, mustard, sugarcane, chilli, spinach, fenugreek, radish, coriander, ladyfinger, and seasonal vegetables etc.
- Almost all farmers use natural cow dung and organic manure as fertilizers for their crops.
- Farmers chose to use this technology as it requires less money.
- Overall expenditure involves mainly irrigation costs, seeds, pesticides, and fertilizers.
- Organic farming produce is mainly used for household purposes only, if the produce is surplus, farmers sell it in local market, or to villagers.
- As far as govt. support is concerned, some farmers received training and awareness from exposure visits conducted by UBA, some got information from UBA team members and some from peer groups. Initially, some farmers received support from the Govt. through Namami Gange Scheme.

Current crops grown through organic farming (includes Brinjal, Cabbage, Napier Grass, Cucumber, etc.)

List of farmers practicing organic farming:

S.No.	Name of the farmer	Village	53	Mr. VIJAY SINGH	Gaindikhata
1	Mr. KHAJAN SINGH	Gaindikhata	54	Mr. VIJENDRA	Gaindikhata
2	Mr. VIKRAM	Gaindikhata	55	Mrs. LUGI DEVI	Gaindikhata
3	Mr. DHRMPAL	Gaindikhata	56	Mr. SURYABHAN SINGH	Gaindikhata
4	Mr. RAMKUMAR	Gaindikhata	57	Mr. SOVAN SINGH	Gaindikhata
5	Mr. KUNWAR	Gaindikhata	58	Mr. PYAR SINGH	Gaindikhata
6	Mr. RAJENDRA	Gaindikhata	59	Mr. KISHAN SINGH	Gaindikhata
7	Mr. DEVENDRA	Gaindikhata	60	Mr. ALOK KUMAR	Gaindikhata
8	Mr. NARENDRA	Gaindikhata	61	Mr. RANVEER	Gaindikhata
9	Mr. RANVEER	Gaindikhata	62	Mr. KUNDAN SINGH	Gaindikhata
10	Mr. RAMESH	Gaindikhata	63	Mr. VINOD KUMAR	Gaindikhata
11	Mr. PURAN	Gaindikhata	64	Mr. PANCHAM SINGH	Gaindikhata
12	Mr. AZAD	Gaindikhata	65	Mr. RAM KUMAR	Gaindikhata
13	Mr. KALU	Gaindikhata	66	Mr. SUSHIL KUMAR	Gaindikhata
14	Mr. IRFAN	Gaindikhata	67	Mr. PRASHANT KUMAR	Gaindikhata
15	Mr. NOOR	Gaindikhata	68	Mrs. SHASHI	Gaindikhata
16	Mr. DHYAN	Gaindikhata	69	Mr. ANIL NAUTIYAL	Gaindikhata
17	Mr. MALKHAN	Gaindikhata	70	Mr. AKBAL SINGH	Gaindikhata
18	Mr. BALVEER	Gaindikhata	71	Mr. MOHD ISHA	Gaindikhata
19	Mr. LAKHAN SINGH	Gaindikhata	72	Mr. SHAMSHER ALI	Gaindikhata
20	Mr. GYAN SINGH	Gaindikhata	73	Mr. SARAJ	Gaindikhata
21	Mr. SHANTANU SINGH	Gaindikhata	74	Mrs. NEK BIWI	Gaindikhata
22	Mr. AKBAR	Gaindikhata	75	Mrs. BHURI BEGAM	Gaindikhata
23	Mr. RAGHUVEER	Gaindikhata	76	Mr. GULAM MUSTAFA	Gaindikhata
24	Mr. SOMPAL	Gaindikhata	77	Mr. GABBAR SINGH	Gaindikhata
25	Mr. FOOL SINGH	Gaindikhata	78	Mr. MAHENDRA SINGH	Gaindikhata
26	Mr. KAKA SINGH	Gaindikhata	79	Mr. JOGENDRA SINGH	Gaindikhata
27	Mr. PANKAJ RAWAT	Gaindikhata	80	Mr. MUSSA	Gaindikhata
28	Mr. MOHAN SINGH	Gaindikhata	81	Mr. SHAMSHAD	Gaindikhata
29	Mr. SHUBHENDU SINGH	Gaindikhata	82	Mr. GULAM RASOL	Gaindikhata
30	Mr. TEK SINGH	Gaindikhata	83	Mr. GULAM RASOL	Gaindikhata
31	Mr. MEHAR SINGH	Gaindikhata	84	Mr. GULAM MUSTAFA	Gaindikhata
32	Mr. AMENDER SINGH THAKUR	Gaindikhata	85	Mr. SOMCHAND	Gaindikhata
33	Mr. SURENDRA SINGH RAWAT	Gaindikhata	86	Mr. GULAM RASOL	Gaindikhata
34	Mr. KALVA	Gaindikhata	87	Mr. ALI JAAN	Gaindikhata
35	Mr. MUKESH KUMAR	Gaindikhata	88	Mr. NOOR ALAM	Gaindikhata
36	Mr. SOHANPAL SINGH	Gaindikhata	89	Mr. IRFAN ALI	Gaindikhata
37	Mr. TEJRAM	Gaindikhata	90	Mrs. SAKINA	Gaindikhata
38	Mr. SHER SINGH	Gaindikhata	91	Mr. NARENDRA KUMAR	Lahadpur
39	Mr. AJEET SINGH	Gaindikhata	92	Mr. ANIL KUMAR	Lahadpur
40	Mr. NATTHI LAL NAUTIYAL	Gaindikhata	93	Mr. SUNIL KUMAR	Lahadpur
41	Mr. GANGARAM KATARIYA	Gaindikhata	94	Mr. PREM SINGH	Lahadpur
42	Mr. JASPAL	Gaindikhata	95	Mr. ASHA	Lahadpur
43	Mr. JASRAM SINGH	Gaindikhata	96	Mr. RISHIRAM	Lahadpur
44	Mr. TRALOCHAN SINGH	Gaindikhata	97	Mr. PRITAM	Lahadpur
45	Mr. CHOTE	Gaindikhata	98	Mr. SITARAM	Lahadpur
46	Mr. TEKCHAND SAINI	Gaindikhata	99	Mr. JAYPAL	Lahadpur
47	Mr. SURENDRA KUMAR	Gaindikhata	100	Mrs. PRAKASHI	Lahadpur
48	Mr. RAGHUVIR SINGH	Gaindikhata	101	Mrs. BHAGIRATHI	Lahadpur
49	Mr. SURESH SINGH	Gaindikhata	102	Mr. SITARAM	Lahadpur
50	Mr. TEG SINGH POKHRIYAL	Gaindikhata	103	Mr. KUSUM	Lahadpur
51	Mrs. MATHURA DEVI	Gaindikhata	104	Mr. PYAR SINGH	Lahadpur
52	Mr. KUNWAR SINGH	Gaindikhata	105	Mr. MEHAR SINGH	Lahadpur

106	Mr. SITARAM	Lahadpur
107	Mr. KALLU	Lahadpur
108	Mr. PRAKASH	Lahadpur
109	Mr. GHANSHYAM	Lahadpur
110	Mr. SUSHIL KUMAR	Lahadpur
111	Mr. SITARAM	Lahadpur
112	Mr. JAYPAL	Lahadpur
113	Mrs. PRAKASHI	Lahadpur
114	Mrs. BHAGIRATHI	Lahadpur
115	Mr. SITARAM	Lahadpur
116	Mr. KUSUM	Lahadpur
117	Mr. PYAR SINGH	Lahadpur
118	Mr. MEHAR SINGH	Lahadpur
119	Mr. SITARAM	Lahadpur
120	Mr. KALLU	Lahadpur
121	Mr. PRAKASH	Lahadpur
122	Mr. GHANSHYAM	Lahadpur
123	Mr. NARENDRA KUMAR	Lahadpur
124	Mr. ANIL KUMAR	Lahadpur
125	Mr. SUNIL KUMAR	Lahadpur
126	Mr. PREM SINGH	Lahadpur
127	Mr. ASHA	Lahadpur
128	Mr. RISHIRAM	Lahadpur
129	Mr. PRITAM	Lahadpur
130	Mr. KARNAIL SINGH	Peeli Padav
131	Mr. VIJAY KUMAR	Peeli Padav
132	Mr. JOGENDRA	Peeli Padav
133	Mr. MAYARAM	Peeli Padav
134	Mr. ASHOK KUMAR	Peeli Padav
135	Mr. BHAG SINGH	Peeli Padav
136	Mr. SURJEET SINGH	Peeli Padav
137	Mr. MEGHRAJ	Peeli Padav
138	Mr. JEET SINGH	Peeli Padav
139	Mr. TARA CHAND	Peeli Padav
140	Mr. KESHAR SINGH	Peeli Padav
141	Mr. HARPAL SINGH	Peeli Padav
142	Mr. MANISH	Peeli Padav
143	Mr. RAM ASHRE	Peeli Padav
144	Mr. JAGDISH SINGH	Peeli Padav
145	Mr. SHRI RAM	Peeli Padav
146	Mr. JAGDISH SINGH	Peeli Padav
147	Mr. HAJURI SINGH	Peeli Padav
148	Mrs. PRITAM KAUR	Peeli Padav
149	Mr. RAMSHWAROOP	Peeli Padav

- **Merits of organic farming**

The introduction of organic farming has provided several benefits to the people of Gaindikhata cluster. We listed the benefits as follows:

- Synthetic pesticides and fertilisers are not used in organic farming because they can be washed off fields by irrigation or rainfall and end up in the Ganga River. The risk of chemical runoff and Ganga River water contamination is decreased by organic farmers by eliminating or drastically reducing the use of these chemicals.
- Farmers may eventually save money by switching to organic farming because it makes the crop grow naturally, they don't need to purchase expensive synthetic fertilisers and pesticides. This lessens the need for expensive inputs.
- The soil quality is improved by organic farming. Farmers can improve the soil's health and fertility by incorporating organic materials like compost and rotating their crops. They won't have to worry as much about diseases and pests, and their crops will grow more effectively as a result.
- Farmers who practice organic farming are encouraged to use natural, readily available resources for soil enhancement, pest control, and fertilization. As a result, they rely less on expensive outside inputs and have more control over their farming practices and expenses.

- **Challenges**

The major challenges faced by farmers practicing organic farming are listed as follows:

- As per survey most of the farmers are facing the problem of pests. Organic pesticides are not so efficient against them.
- Some villagers are using ash as pesticide, and some are not even using anything to control pest growth.
- There are many govt schemes (for e.g.- Namami Gange scheme) which provides organic fertilisers and pesticides, but some farmers are barely getting any support from these schemes.
- Apart from fertilisers and pesticides, wild animals (Monkey, elephant, boar, etc.) are also creating problems in farming.
- Although these villages are situated near Ganga River, water supply still plays a crucial role in crop production.

Crops destroyed by insects and wild animals

3.4 Honey Production/Beekeeping

- **Introduction**

  Beekeeping in Indian villages is a traditional practice that provides a sustainable livelihood for farmers. It involves managing honeybee colonies for honey, beeswax, and other products. Beekeeping boosts agricultural productivity through pollination, supports biodiversity, and offers an additional income source. Challenges include limited knowledge, resources, and pest control. Efforts are underway to promote beekeeping and empower rural communities for sustainable practices.
  Initially 25 boxes were provided to each farmer family, training was also given to them for the feeding of bees, extraction of honey from the comb and how to take care of bees for the maximum output. Around 25 farmers received training at the cluster. The results can be seen below.

Beekeeping Boxes and honeybees in the honeycomb

- **Impact and Current status**

  The distribution of beekeeping boxes by Horticulture Department, Uttarakhand in the Gaindikhata village cluster has brought positive changes. Villagers now have an additional income source through honey sales. Increased bee populations have improved crop yields, benefited farmers, and ensured food security. The beekeeping boxes also promote biodiversity and ecological balance, attracting wildlife and preserving natural resources. Moreover, sustainable beekeeping practices have raised environmental awareness and encouraged responsible land management. Overall, this initiative is transforming livelihoods, enhancing agriculture, and fostering a greener future for the community.

  After the interaction of our team with the farmers the current status of honeybee keeping can be described as-

  - Currently Farmers are heaving number of boxes ranging from 25 to 500. Some of the farmers with a smaller number of boxes are using them mostly at home and selling to local people.
  - Farmers with large number of boxes sell the honey to local as well as to the Honey supplier companies. They even migrate the boxes to Rajasthan seasonally for good production.
  - Famers are using extraction machines for the extraction of honey of which they were given training.
  - Transportation, feed, new boxes, extractor machines, etc. are major areas of expenditure.

- One box produces approximately 25-30 Kg honey and gives earning of around Rs. 1000 per year. This earning is flexible as sometimes the production is less and sometimes more.
- Some farmers received financial support in the form of loans which helped them to enhance their production.

Farmers showing their beekeeping boxes and honeycombs at Gaindikhata and Peeli Padav

Honey Extractor Machine

Chemicals used by farmers for disease maintenance

Primary Stakeholders of Honey production/beekeeping:

S.No.	Name of the Stakeholder	Father's/Husband Name	Village	Category	No. of boxes	Mobile No.	Beneficiary contri.	Our Support	Total
1	Kusum Devi	Shyam Lal	Lahadpur	OBC	25	9548068913	20,000	80,000	1,00,000
2	Harpal	Shyam Lal	Lahadpur	OBC	25	9458108165	20,000	80,000	1,00,000
3	Poonam Devi	Ganeshi Singh	Rasoolpur	OBC	25	9548068913	20,000	80,000	1,00,000
4	Mintu Singh	Harswaroop Singh	Dalupuri	SC	25	7464806314	20,000	80,000	1,00,000
5	Avatar Singh	Raghuveer Singh	Chidiyapur	GEN	25	8533013781	20,000	80,000	1,00,000
6	Preetam Singh	Dalpat Singh	Lahadpur	OBC	25	9456713295	20,000	80,000	1,00,000
7	Jitendra Singh	Munesh Singh	Rasoolpur	OBC	25		20,000	80,000	1,00,000
8	Gaurav Singh	Chandra Pal	Rasoolpur Meethi Beri	OBC	25	7017057034	20,000	80,000	1,00,000
9	Vijaypal	Babu Ram	Lahadpur	OBC	25	7454839145	20,000	80,000	1,00,000
10	Sompal Singh	Veer Singh	Peeli Padav	OBC	25	9411551809	20,000	80,000	1,00,000
11	Sahdev	Rajendra Singh	Shyampur	OBC	25	9917303791	20,000	80,000	1,00,000
12	Sanjeev Kumar	Harswaroop	Dhandiyanwala	ST	25	8475094548	20,000	80,000	1,00,000
13	Rajeev Kumar	Ram Kumar	Dhandiyanwala	ST	25	6398361645	20,000	80,000	1,00,000
14	Dimple	Mahesh Kumar	Dhandiyanwala	ST	25	7906041382	20,000	80,000	1,00,000
15	Meghraj Singh	Dharm Singh	Peeli Padav	ST	25		20,000	80,000	1,00,000
16	Balwant Singh	Rajkumar	Dhandiyanwala	ST	25	6395067004	20,000	80,000	1,00,000
17	Zahoor Hussain	Gulam Mustafa	Sajanpur peeli	OBC	25	7464813326	20,000	80,000	1,00,000
18	Pramod	Surendra	Kangri	OBC	25	9690043550	20,000	80,000	1,00,000
19	Irfan	Yusuf	Gajiwali	OBC	25	8791428679	20,000	80,000	1,00,000
20	Asif Ali	Gulam Rasool	Sajanpur peeli	OBC	25	9719519111	20,000	80,000	1,00,000
21	Rishipal	Ghasita	Dudhala Dayalwala	OBC	25	9548068913	20,000	80,000	1,00,000
22	Kusum	Vinod	Gaindikhata	GEN	25	8859984828	20,000	80,000	1,00,000
23	Sunil Sharma	Mahavir Sharma	Shyampur	GEN	25	9639476136	20,000	80,000	1,00,000
24	Harvila Devi	Ajeet Singh	Shyampur	GEN	25	9719963789	20,000	80,000	1,00,000
25	Prashant Chauhan	Dilawar Singh	Shyampur	GEN	25	9917595225	20,000	80,000	1,00,000
				Total	625	**Total**	5,00,000	20,00,000	25,00,000

- ## Challenges

  Challenges faced by farmers in bee keeping are as follows:

  - **Transportation and Hive Theft:** Bees rely on a diverse range of flowering plants for nectar and pollen collection. Due to Insufficient availability of suitable floral resources in the vicinity of bees they need to be transported. Transportation is the biggest challenge for beekeepers due to the delicate nature of bee colonies and the need to minimize stress during transit. Ensuring the safe and secure transport of bees and their hives over long distances while maintaining suitable temperature and ventilation conditions is crucial for their well-being. Farmers reported theft cases in remote areas while transporting their boxes which caused major loss for them.

  - **Pests and Diseases**: Beehives are vulnerable to various pests and diseases, including mites, beetles, and fungal infections. Farmers said that disease and fungus attack destroyed their production, and it is very difficult to manage it.

  - **Seasonal Factors**: Beekeeping is highly influenced by seasonal changes. Extreme weather conditions like harsh cold and hot season negatively impact the yield and quality of honey. One farmer reported that his boxes caught fire recently in the hot weather outside which caused death of many bees. So, temperature management is the key challenge for many farmers.

  - **Market**: Famers reported huge variations in the market price and selling price of the honey. The selling price also varies from time to time. There is a lack of a proper market for the beekeepers.

  - **Further Training**: Some farmers are interested to know the extraction process of royal jelly from the beehives. They are expecting a training session related to royal jelly extraction which can give a huge boost to their income.

3.5 Lemongrass cultivation

- **Introduction**

  Lemongrass, scientifically known as Cymbopogon, is a tall, perennial grass-like plant with long, slender green leaves. It has a distinct lemony flavor and fragrance. The flavor is fresh, citrusy, and slightly sweet, with hints of ginger. It is a tufted, coarse plant with linear leaves that grows in dense clusters. It has a strong base and reaches a height of about 2 to 3 meters with a meter-wide spread. Along with its culinary, it has a variety of medical uses and is highly sought after because of its antibacterial, antifungal, and antimicrobial qualities. It grows best in hot regions and benefits from full sun. It needs well-drained soil.

  A few years ago, the farmers of the cluster reported destruction of their crops by wild animals including monkeys, elephants, nilgais, wild pigs, etc. To resolve this problem, UBA started the trial of lemongrass at the cluster with the help land conservation dept., Uttarakhand as animals don't eat lemongrass and even not come close to it due to its fragrance. UBA motivated the farmers to grow lemongrass who had lost hope and stopped cultivation due to wild animal destruction. With the help of ONGC CSR, lemongrass saplings were first sown after which we can see the positive results at the cluster. Two oil extraction plants at Shyampur and Peeli Padav have been established with the support of cooperative department, Uttarakhand.

- **Uses of lemongrass**

  Lemongrass is a versatile herb, and it has a wide variety of use, some are:

  - **Medicinal Properties**: Lemongrass has been used in traditional medicine for its various health benefits. It contains essential oils, including citral, which gives it its distinctive aroma. Some potential health benefits associated with lemongrass include relieving digestive issues, reducing inflammation, alleviating anxiety, and promoting relaxation.
  - **Culinary Uses**: Lemongrass is a popular ingredient in many Asian cuisines, particularly in Thai, Vietnamese, and Indonesian dishes. It is often used in soups, curries, stir-fries, marinades, and teas to add a tangy, aromatic flavor. The tender inner stalks are typically sliced or pounded before use.
  - **Essential Oil**: Lemongrass essential oil is extracted from the leaves and stalks of the plant. It is commonly used in aromatherapy for its invigorating and uplifting scent. The oil is also used in cosmetic products, soaps, and candles.
  - **Tea and Infusions**: Lemongrass tea is a popular herbal beverage. It is often made by steeping fresh or dried lemongrass leaves in hot water. The tea is refreshing, soothing, and believed to have calming effects.
  - **Mosquito Repellent**: Lemongrass has insect-repellent properties, and its oil is sometimes used in natural mosquito repellents.

- **Why Lemongrass in Gaindikhata Cluster?**

Farmers were facing a significant problem as their crops were being destroyed by forest animals such as monkeys, nilgais, and elephants. This loss has resulted in a decline in farmers' enthusiasm for crop cultivation unless they have extra laborers to protect their fields, which is often not affordable. The situation is worsened by the fact that elephants cannot be stopped from consuming crops like sugar cane. As a result, farmers are seeking alternative uses for their land. Lemongrass has emerged as a ray of hope for many farmers as it can potentially replace or reduce their losses. It offers several advantages such as easy cultivation, lower risk, minimal investment, and assured market demand and income. Compared to crops like paddy or Rabi, lemongrass requires much lower cultivation costs. Once the lemongrass sapling is planted in the field, it can continuously yield grass for up to five years, with harvesting possible every four months. By adopting mixed-cropping techniques, farmers can generate even higher profits from lemongrass cultivation.

- **Impact and Current Status:**

The initiative of farming lemongrass in Gaindikhata has proven to be a resounding success. The introduction of lemongrass in this region has created numerous favorable opportunities and avenues for the local farming community, ultimately leading to an improved socio-economic status for the farmers. Moreover, lemongrass cultivation has established a dependable and sustainable source of income for the farmers in the long run. With the ability to grow this cash crop throughout the year, farmers are no longer solely reliant on seasonal crops, providing them with increased stability and flexibility in their agricultural endeavors.

Current lemongrass field visit at Sajanpur Peeli

Following are the interaction with the farmers, their current situation is outlined:

- Farmers express satisfaction with their choice to cultivate lemongrass, as the expenses associated with lemongrass farming are minimal, and it has proven to be a highly profitable venture for them.
- Lemon grass cultivation is just in its initial phase for many farmers, they are slowly learning about it.
- Wild animal attacks on crops were a significant issue for farmers. Lemongrass cultivation prevents animals from approaching the farm due to its aromatic smell. Some farmers also mentioned that lemongrass helps protect their other crops from wild animal attacks.
- Oil extraction plants are not so far from the farms, this plant doesn't require more manpower. It can be operated easily by just 1-2 individuals.
- On an average, a Farmer cultivating lemongrass produces 13-14 litre Oil in 5 bigha (~ 3 acres) of land in 4 months. In a year, lemongrass can be harvested easily three times.

Lemongrass field, household survey, and oil extraction plant at Peeli Padav and Lahadpur

List of farmers who has own lemongrass saplings

Sl. N.	Name	Father Name	Village Name	Mob. No.	Cultivated area
1	Prem Saini	Pradhan Singh	Lahadpur	7500074988	5 Bigha
2	Sudhakar Kumar	Santram	Pilli Padao	9720631792	5 Bigha
3	Madhu Gupta	Shree Satendra Gupta	Gaindikhata	9650170235	3 Bigha
4	Harendra Singh	Shyam Singh	Laldhang	9012817537	5 Bigha
5	Pankaj Kumar	Shree Hanshraj	Pilli Padao	---	4 Bigha
6	Rekha Kumari	Shree Jit Singh	Pilli Padao	7409482903	2 Bigha
7	Danveer Singh	---	Pilli Padao	--	4 Bigha
8	Narendra	Shree Nathu	Jaspur Chamaria	9639426390	5 Bigha
9	Shekhar Singh	Ramratan Singh	Jaspur Chamaria	9675391509	5 Bigha
10	Surendra Singh		Shyampur	9917192183	5 Acre
11	Sahdev Singh		Shyampur	9917303791	5 Acre
12	Kashmiri Lal		Pilli Padao	6395948672	10 Bigha
13	Shashi Jhandwal		Pilli Padao	9719146650	5 Bigha

- **Challenges**

Although lemongrass is a self-sustaining crop with low maintenance requirements, farmers still face some challenges:

- Due to excess rainfall, these crops absorb more water resulting in less oil extraction than usual.
- Because of the lack of farmer-to-market linkage, some farmers could not sell their first crop of Lemongrass in the market.

3.6 Smokeless cookstove

- **Introduction**

  Wood burning fires have long been a common method for cooking and generating heat in rural areas. However, these traditional cooking methods release carbon and other harmful emissions into the atmosphere, posing health risks for individuals exposed to the smoke. The implementation of clean-burning and efficient cookstoves has shown significant positive impacts. These TEG cookstoves were provided through the ONGC CSR, aiming to reduce harmful emissions and improve cooking efficiency in rural areas.

- **Impact and Current Status**

  - During the study, it was observed that some people had integrated a smokeless chimney above their traditional *chulha* (stove). However, these modifications were not efficient primarily due to their poor design, resulting in limited adoption and subsequent abandonment by the users.
  - We found that the integration of smokeless stoves had initially shown promising results. However, most of the people in the villages had stopped using these stoves and reverted to traditional methods of cooking.
  - A smokeless cookstove user group has been formed in the cluster and a bank account has been opened with that group name in Punjab and national bank at Shyampur branch.
  - Smokeless cookstoves have brought awareness among the people to use clean energy for cooking in the kitchen. Now many families are changing their kitchen design and new version of smokeless cook stove.

Old and New TEG cookstove inspection at Gaindikhata

- The primary reason for discontinuation was the availability of more efficient alternatives. While the smokeless stoves initially produced smoke for the first 10-15 minutes of use, they provided a better cooking experience overall. However, it required cutting wood into smaller pieces, which was time-consuming. Moreover, the quality of the equipment provided with the stoves varied, with some being in poor condition. There was a noticeable difference in efficiency between the older stoves and the newer ones, with the latter being more efficient.

List of the old TEG cookstove beneficiaries:

S No.	Name of the beneficiaries	Village	Beneficiaries Contribution	ONGC Contribution	Total
1	Suraj Prasad Saini, S/O- Kailash Chand Mob. No.- 9837144537	Gaindikhata	500	5300	5800
2	Manjit Singh, W/O- Jasvir Singh Mob. No.- 7617723200	Laldhang	500	5300	5800
3	Baijanti Devi, W/O- Kumud	Laldhang	500	5300	5800
4	Manish Mob. No.- 7248692468	Gaindikhata	500	5300	5800
5	Gurudev Singh S/0- Jasmer Singh Mob. No.- 9758372824	Gaindikhata	500	5300	5800
6	Punam Negi W/O – Digambar Singh Negi	Laldhang	500	5300	5800
7	Sharda Devi W/O- Prof. R. Shankar	Pilli Padav	500	5300	5800
8	Sudhakar s/o – Santram Singh	Pilli Padav	500	5300	5800
9	Shamshad Ali	Pilli Padav	500	5300	5800
10	Pilli Padav high School (Shree Bijendra Negi) Mo No- 9412964347	Pilli Padav	500	5300	5800
11	Saraswati Shishu Vidya Mandir Mob. No.- 941217012	Gaindikhata	500	5300	5800
		Total	5500	58300	63800

List of the new TEG cookstove beneficiaries:

S. No.	Name of the Beneficiaries	Mobile No.	Village	Beneficiaries Contribution	ONGC Contribution	Total
1	Sangeeta Kumar	9720631792	Pilli Padao	500	2400	2900
2	Sultan	9411359626	Pilli Padao	500	2400	2900
3	Firoj	9690076565	Laldhang	500	2400	2900
4	Arjun (Portable version without power pack)	9084941916	Laldhang	200	1000	1200
5	Gurudev Singh	9758372824	Gandikhata	500	2400	2900
6	Naresh Saini		Naurangabad	500	2400	2900
			Total	2700	13000	15700

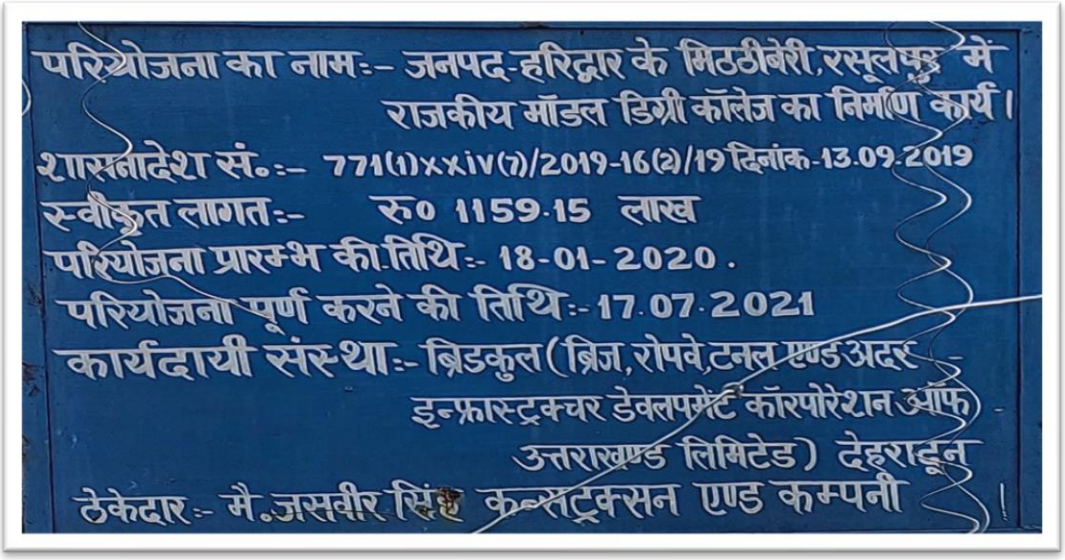
- **Challenges faced by farmers**
  - Maintenance and repair of the smokeless stoves posed difficulties for the villagers. In case of any malfunction or damage, it was observed that the villagers lacked the knowledge and resources to repair them. As a result, they faced challenges in preparing meals for their families.
  - The kitchen chimneys made in the houses are very less efficient in reducing the smoke and this is a huge construction failure for the villagers. New construction is unaffordable for them.

Inefficient chimney design in the kitchen, Peeli Padav

3.7 School Education and Model Degree College

- **Introduction**

  Unnat Bharat Abhiyan, IIT Delhi is working for the betterment of education at Gaindikhata cluster. The UBA team members conduct quality educational sessions at various schools at the cluster time to time which helps the students get better knowledge, quality education, and lot of awareness. Recently, UBA found a potential issue in the education system at the cluster that there was no degree college nearby the cluster, students went to Haridwar for their higher studies after their Senior Secondary education. So, UBA initiated the construction of a model degree college at Meethi Beri, Rasulpur for higher education of students of Gaindikhata cluster.



Model Degree College (instruction board and front view), Meethi Beri, Rasulpur

- **Impact and current status**

  The results were seen in the discipline, awareness, and behaviour of the school students we met in various school visits. Some of the key points related to the school education intervention program are listed below:

  - The students at the visited schools were well-behaved, disciplined, well-aware, and smart.
  - We received immense respect from the school principals, staff, and students. Particularly, the students at Saraswati Shishu Vidya Mandir School, Gaindikhata were seen as more goal-oriented, had good knowledge of the field of their chosen goals and future.
  - Extra-curricular activities are well appreciated and practiced at the schools which are always beneficial for students. Sports activities are also encouraged by the schools, which are very important in a student's life.
  - Students are aware of the technologies emerging in the world, for example – AI, IoT, Computer software, mobile applications, etc.
  - We also contributed towards better awareness of students and teachers regarding latest technologies and goal-oriented thinking and teaching rather than focusing on marks and grades.
  - The construction of the model degree college is currently going on at a slow pace. The Open-Air Theatre and Girls Hostel are almost completely constructed. The main building is under construction.

Saraswati Shishu Vidya Mandir School, Gaindikhata

Government School, Peeli Padav

Girl's Hostel (front view), its mess, and rooms at model degree college

- **Challenges**
  - The expected completion date of construction of model degree college was 17-07-2021, but the completion has been delayed a lot.
  - Some school students use social media without any safety awareness which is a matter of concern. Awareness sessions need to be conducted for both parents and students for conscious and safe use of social media and technology. Cyber security awareness needs to be given to all teachers, parents, and students. Excessive digital gaming is also a major problem for some students which needs to be considered a matter of concern.

Current status of ongoing construction of model degree college

3.8 Self Help Groups (SHGs) and Health Camps

- **Introduction**

Self-Help Groups (SHGs) are grassroots community-based organizations of 10-15 members that bring individuals together to address common challenges, foster self-reliance, and promote collective action. These groups, often composed of women, empower members to take control of their lives, enhance financial capabilities, and advocate for their rights. SHGs have gained recognition as effective platforms for socio-economic transformation, promoting gender equality, education, and community cohesion. This section examines the significance of SHGs, their functions, positive impacts on individuals and communities, and the challenges they face. The goal is to ensure sustainability and long-term impact, allowing SHGs to contribute to poverty reduction, women empowerment, and community development while achieving the Sustainable Development Goals (SDGs). With support of Chief Development Officer, Haridwar and State livelihood mission, UBA formed women SHGs and opened their bank accounts for micro-finance support through SRLM.

Weekly Health Camps: To address the problem of non-availability of healthcare facilities in Naurangabad village, UBA organizes weekly health camps and health awareness meetings with support of Ramkrishna Mission Hospital, Kankhal and Krishnayan Gaushala, to provide healthcare facilities to the villagers.

- **Functions of SHGs:**

- ✓ One of the primary functions of SHGs is to promote regular savings among its members. Members contribute a predetermined amount to a collective fund during regular meetings. These savings are then used to provide small loans and credit facilities to the members for income-generating activities, emergencies, or other personal needs. SHGs act as informal financial institutions, helping members overcome financial constraints and reducing dependence on moneylenders.
- ✓ SHGs prioritize the capacity development of their members through various training programs. These training sessions focus on enhancing entrepreneurial skills, financial literacy, bookkeeping, marketing strategies, and other relevant skills.
- ✓ SHGs provide a platform for members to come together, share experiences, and offer mutual support. Group meetings create a supportive environment where members can discuss personal issues, seek advice, and share their triumphs and challenges. This social support network helps alleviate feelings of isolation, boosts self-esteem, and promotes emotional well-being among members.
- ✓ SHGs encourage members to collectively voice their concerns, advocate for their rights, and engage in community development initiatives. Through collective action, SHGs address social issues, promote gender equality, and contribute to community welfare. They may collaborate with local authorities, NGOs, and government agencies to create positive changes in their communities.
- ✓ SHGs act as platforms for sharing information, knowledge, and best practices among members. They facilitate discussions on various topics such as health, education, hygiene, and government schemes, raising awareness and promoting behaviour change within the community. This knowledge sharing helps members make informed decisions and adopt beneficial practices for themselves and their families.

- **Impact and current status**

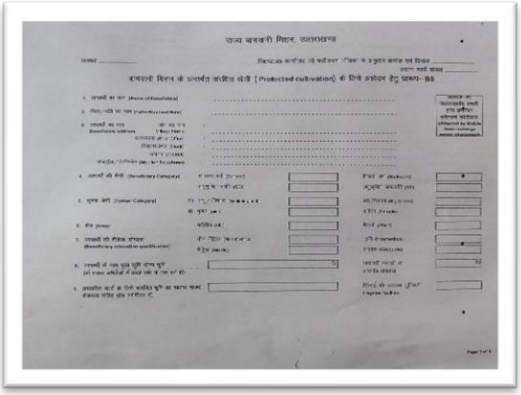
SHG has become a revolutionary group in rural area which helps to improve economic conditions of women and small farmers. Some impacts of the SHG at Gaindikhata cluster are as follows:

- Women have started acting against the social evils such as in Lahadpur, country liquor (desi sharaab) makers were thrown out of the village.
- Contribution of women in beekeeping, organic farming and polyhouses is admirable. Ten polyhouse construction forms were distributed in the SHG meeting at Laal Dhaang on 17-05-2023, which shows that women are actively participating in the UBA interventions and are aware about all the ups and downs of the society. Also, their president was also selected in the meeting who manages all the SHGs.

Interaction with SHG members and their head at Laal Dhaang Panchayat Bhawan

- Many SHGs were present at the meeting which includes Vaishnavi group, Astha group, Yamuna group, Jai Mata Di group, Kamal group, Asha group, Pragati group, etc. Each group contains almost 15-20 members. The members include teachers, small businesswomen (tailor and beauty), graduates, post-graduates, and housewives. This shows a wide community engagement in women SHGs.
- SHGs encourage women to grow mushrooms in their monthly meetings and they are cooperating with organizations such as UBA, Udyan Vibhag, and Gram Panchayat, etc.
- Bank accounts are being opened and recently, women are learning to make Incense stick (agarbatti).

Discussion with members of various SHGs



Polyhouse construction form

- **Challenges**

- The Laal dhaang panchayat bhawan is in a very poor condition where the monthly meetings of SHGs are held. It is a major challenge that needs to be addressed by providing a new and good destination for meetings.
- The cluster lacks a good quality primary treatment hospital to tackle medical emergencies. We need to travel to Haridwar for it, which may be fatal sometimes.

3.9 Awareness and Capacity Building interventions

Unnat Bharat Abhiyan, collectively with Surabhi Foundation, Cooperative department, Horticulture Department, and Food and Processing Department had conducted many training programs for capacity building in the modern agricultural practices such as polyhouse technology, lemongrass cultivation, organic farming, mushroom cultivation, etc. Along with these, they had conducted multiple awareness sessions at village level, school level, and panchayat level to spread awareness regarding plastic free village, drinking boiled water, sanitation, etc. They had provided immense support to the farmers in the form of seeds, saplings, pesticides, manure, and many more basic things to practice a good income generating agriculture.

After interacting with farmers, students, teachers, gram pradhans, below are some of the collected key-points describing the current scenario:

- ✓ The effect of awareness sessions and rallies can be seen in the cluster. Many people were seen using cloth bags instead of plastic at Gaindikhata.
- ✓ Many villagers either initially had or constructed personal toilets for proper sanitation.
- ✓ Most of the people in the villages use water extracted from handpump.
- ✓ The capacity building programs has been successfully implemented as the farmers who received training are using their skills to generate a good income and are dedicated in their efforts in the agricultural practices.
- ✓ The farmers who did not attend the training are getting the information from the received ones and are engaging in new agricultural practices. Our survey contains many such farmers who did not receive training, but they are performing well on the field with their skills learnt from the peer farmers.
- ✓ Farmers receive constant support from all the departments, Krishnayan Gaushala and UBA, in the form of seeds, fertilizers, organic manure, pesticides, etc. for their crops.
- ✓ Recently, the Krishnayan Gaushala announced to distribute free organic manure (slurry) created at their CNG plant to the farmers of nearby villages. Initially, it required a huge amount of money to buy it.
- ✓ Initially, UBA provided the beekeepers 25 boxes to start their production. Now, after creating profit from honey production, some farmers have invested more and increased the no. of boxes to increase production. One farmer has converted the number 25 to 500 boxes for beekeeping. His earnings have been boosted significantly.
- ✓ Some farmers already had the skill of beekeeping, but they used to use traditional method to extract honey, but UBA had given them opportunity to enhance their livelihoods and use their skill to live a good and sustainable life.

Along with the positive responses from the cluster, we had come through some challenges and demands for us which still need to be addressed. Few of them are listed below:

- Analysis of the knowledge of farmers in the cluster says that some of them are still unaware of the disease and pest management. They either didn't act if their crops were attacked by insects or any disease or use the wooden ash as pesticide which is less effective than any other pesticide.
- The above type of mismanagement is caused because some farmers are not aware of the schemes and support provided by various organizations and departments. For example – some farmers didn't know anything about Namami Gange Scheme. In this case, either they use nothing or buy some cheap products from the market which is ineffective and harms crop yield and quality.
- Since many farmers have the skills of honey production, some farmers are interested to know about the extraction of royal jelly of the bees for which they are expecting us to provide some capacity building program or awareness session about royal jelly extraction.
- Interaction with Sajanpur Peeli's Gram Pradhan and Surabhi Foundation's cluster chief shows a major challenge to us. They said that Swachh Bharat Abhiyan created waste segregation centre at their village which was a huge failure due to lack of awareness. The working process of the segregation centre was a mystery for them due to lack of training. Also, the public washrooms made in the village were used as a *paan shop* or sometimes people made dung cakes and stuck them to the walls of the washroom. People used dustbins to fetch and store water, which were provided for waste treatment by the gram panchayat. This shows that people are still not applying the awareness they are receiving.

Sharing knowledge of AI and IoT with students

Meeting with Peeli Padav's Gram Pradhan

Discussion with Sajanpur Peeli's Gram Pradhan about community awareness

3.10 All-weather Road connectivity (Naurangabad to Gaindikhata)

Through Pradhan Mantri Gram Sadak Yojana, a PCC road was made from Naurangabad to Gaindikhata. While household visits and surveys were going on in 2017, Villagers demanded a good PCC road from Nauranabad to Gaindikhata, as the old way was too dusty in dry conditions and too muddy in wet conditions. With the construction of this road, it is now easier to transport goods, vegetables, milk, etc. to the market on vehicles. Recently, people can be seen on bicycles and motorcycles carrying milk to the dairy, situated near the road in Gaindikhata. The road connectivity has boosted livelihoods of people and made the villager's life easy and qualitative.

PCC Road connectivity from Naurangabad to Gaindikhata

3.11 Hybrid Seed Distribution and Plantation

- With the support of Horticulture Department, cluster's farmers were provided hybrid seeds of Guava, lemon, amla, seepage, etc. Overall, 5000 seeds were distributed to the farmers which also includes many vegetables, turmeric, etc.
- Recent survey says that farmers who are getting these seeds are sowing them in their fields, some in polyhouses, and some are unaware of the seed distribution.
- Farmers said that they are using sankar variety seeds which gives them high yield and quality.

Banana plantation at a field

Distributed seeds grown in polyhouses

3.12 Azolla Farming

Azolla is a small aquatic fern that grows rapidly and has been used as a biofertilizer and livestock feed. It has a symbiotic relationship with the nitrogen-fixing cyanobacterium Anabaena azollae, which allows it to convert atmospheric nitrogen into organic nitrogenous compounds, thereby enriching the soil. UBA has provided sufficient materials for azolla cultivation in the cluster such as artificial pond sheet and other substances required for cultivation. Its result has been seen recently in the survey as some famers are efficiently growing azolla and making their livelihood better.
Azolla farming is gaining popularity as a sustainable and eco-friendly practice due to its several advantages. Here are some potential benefits:

- Azolla has the ability to fix atmospheric nitrogen, which makes it an excellent biofertilizer. When incorporated into the soil, it enhances nitrogen content and improves soil fertility, reducing the need for synthetic fertilizers.
- Azolla has a high protein content (up to 30%) and is rich in essential amino acids. It can be used as a nutritious feed supplement for livestock, particularly poultry and fish. Azolla can be grown alongside fishponds, providing an additional source of feed and helping maintain water quality.
- Azolla forms a dense mat on the water surface, preventing the growth of weeds by blocking sunlight. This property is especially useful in paddy fields, where it can suppress weed growth and reduce the need for herbicides.
- Azolla acts as a natural water reservoir, reducing evaporation and maintaining soil moisture. It helps conserve water in irrigated fields and minimizes water requirements for crop cultivation.
- Humas can also eat it. It is tasteless, natural immunity booster.
- If we mix half kg of Azolla in animal food then their milk quality is improved, they don’t suffer from Thanela disease and also help for better reproduction in animals.

Azolla farming at Lahadpur

4. OPPORTUNITIES

The overall analysis of the Gaindikhata cluster shows the positive and sustainable impact of the interventions led by Unnat Bharat Abhiyan, IIT Delhi with the help of Surabhi Foundation and other govt. organizations and departments. The initial step to make the village livelihood better has been successfully taken and desired outputs can be seen. But still there is a demand for some more collective efforts to resolve the challenges faced by many farmers and the intervention. Some of the key steps to help farmers overcome their challenges as well as some new opportunities are as follows:

- **Mobile Scarecrows:** Using the concept of traditional way of avoiding birds and animals to destroy crops, we can design a very simple cloth material or plastic scarecrow which has motion capability in windy weather. It could be a short-term solution for farmers to protect their crops from wild animals.

- **Wind and Solar Energy:** Farmers reported descent wind speed in the area which can be utilized as an energy resource on both large and small scale. For e.g.- a small fan can solve two problems: first, if used at the top of the kitchen chimney, it can solve the smoke problem as an exhaust fan, and second it can be used to create small amount of energy which can be used efficiently. On a big scale, we can think of windmill plants in hilly areas as high wind speeds were reported by the farmers. Solar energy is also a good source to meet the energy needs of the cluster and limit the use of woods and fossils for a sustainable life.

- **Awareness Sessions:** There is a need for more awareness in the cluster as many farmers are unaware of the support provided by us and the govt. as well as disease and pest management is another issue for them that must be solved. Digital and Social Media awareness, especially for students, is another key topic for awareness. Royal jelly extraction technique could be another topic to be considered.

5. CONCLUSION & REFERENCES

Conclusion

The intervention programs implemented under the Unnat Bharat Abhiyan initiative by IIT Delhi in the Gaindikhata cluster have yielded significant progress in various agricultural interventions. The promotion of lemongrass cultivation has not only provided an alternative cash crop but also enhanced income diversification for farmers. The establishment of polyhouses has extended the growing season and protected crops from adverse weather conditions, resulting in improved yields and income stability. The adoption of organic farming practices has not only reduced chemical usage but also improved soil health and product quality. Additionally, the introduction of mushroom cultivation has provided an additional source of income for farmers and contributed to value addition in the agricultural sector. Women's self-help groups have empowered women, leading to economic independence and entrepreneurship. Accessible healthcare facilities and sanitation initiatives have improved the overall well-being of the community. Skill development programs have equipped individuals with essential competencies for better job opportunities. Continued collaboration, monitoring, and evaluation will ensure sustained progress in the Gaindikhata cluster, driving holistic development and enhancing the quality of life for its residents.

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- Krishnayan Gaushala
- Local community and villagers
- SHG members
- Govt. school teachers and studetnts
- Nature

THANK YOU