

# **ENHANCING FOOD SECURITY OF RURAL FAMILIES THROUGH PRODUCTION, PROCESSING AND VALUE ADDITION OF REGIONAL STAPLE FOOD GRAINS IN INDIA**

**Sponsored By:**

**IDRC,MSSRF**

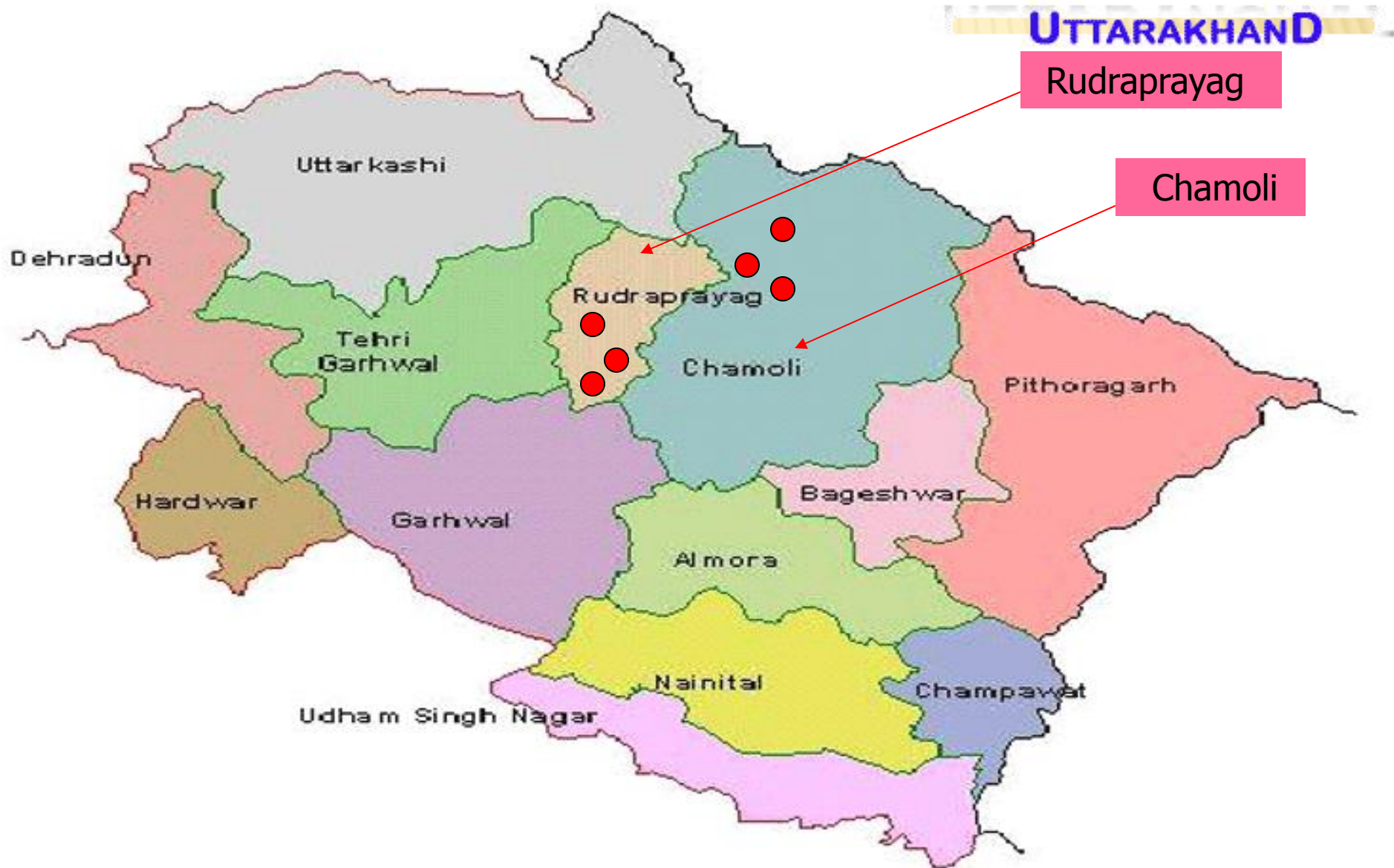
**Implemented by**

**Himalayan Environmental Studies & Conservation Organization  
(HESCO), Shuklapur, Dehradun, Uttarakhand**

# OBJECTIVES

- The overall objective of the project is to strengthen rural household food, nutrition and income security by increasing the cultivation, consumption and marketing of locally important, underutilized, and nutritious grains in district Chamoli and Rudraprayag
- The specific objectives of the project are as follows:
  - ❖ Testing and improved understanding of farmer participatory technological intervention to increase the productivity and production of locally important food grains:
  - ❖ Development and testing of locally appropriate technological solutions to crop management and post harvest operation such as threshing, grain processing and storage;
  - ❖ Development and extension of successfully demonstrated women-oriented farm to market value chain for products from local crops; and
  - ❖ Providing nutrition education for women, men and children to promote household consumption of traditional food grains;

# SELECTION OF THE PROJECT AREA



# PROFILE OF THE PROJECT AREA

S. N.	Parameter	Villages (Rudraprayag)			Villages (Chamoli)		
		Chauki	Nagrasu	Bhatt gaon (CV)	Paini	Saloor	Dungra (CV)
1.	No. of families	47	106	48	71	85	76
2	Total population	243	641	250	431	615	511
3	Total land(Nali)	2545	2800	2150	2260	2940	2780
	(a) Irrigated	300	1900	1400	150	Nil	Nil
	(b) Un irrigated	2245	900	750	2110	2940	2780
4	Cattle / family	6-7	6-7	5-6	7-8	7-8	4-5
5	Forest types	Pine	Pine	Pine	Pine	Pine	Pine
6	Economy	Agriculture & money order	Money order based	Money order based	Money order & agriculture	Money order based & Agriculture	Money order based & Horticulture

# STATUS OF MILLET CROPS

- ❖ Production cost for the finger millet and barnyard millet is approximately Rs. 5000/ha and Rs.5, 500/ha respectively.
- ❖ Average yield of the finger millet and barnyard millet is 6.25 q/ha and the farm gate value is Rs. 8.9/kg.
- ❖ Average straw yield of finger millet and barnyard millet is 7.5q/ha and 20.8q/ha respectively.
- ❖ Farmers in these particular villages do not sell the straw.
- ❖ Farmers still thresh out their millet grain by beating process. Beating is done in open area. It contains stone and mud.
- ❖ Farmers store whole grain at least for 5-6 months in wooden boxes and flour as per the family size in steel box for a month only.
- ❖ Every farmer stores the straw for their domestic animals.
- ❖ Farmers store straw by hanging on tree and damping system.

# STATUS OF MILLETS

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The overall bench mark survey reflects :

- ❖ Farmers believe that millets are one of the most important food grains, and have its own traditional value. It also provides fodder for the animals.
- ❖ The major constraints for cultivation of millet crops are lack of improved cultivation technology, non availability of high yielding variety of seeds, lack of man power and lack of value addition facility.
- ❖ Women of villages are not associated with any local society for their own development, but during the survey it was found that they are really interested in becoming a member.
- ❖ Farmers are growing millet crops by traditional method and not getting satisfactory production.
- ❖ Farmers neither selling the grains nor the straw of millet crops.

# PROPAGANDA DEVELOPMENT, EXTENSION AND AGREEMENT

The technical aspects of the programme were discussed with the farmers. After the detail discussion, farmers were agreed for the same. The highlights of the discussion are as follows:

- ❖ The farmers will provide the land free of cost and the produce will be owned by the farmers.
- ❖ The unskilled labour will be provided by the farmers. Support in case of additional help, organization will manage it from the project.
- ❖ The farmers will maintain the crop as per direction of the project staff.
- ❖ The technical backup (method of cultivation and harvesting, post harvesting technology) will be provided by HESCO and MSSRF
- ❖ The farmers will share the experiences with other farmers also.

# SELECTED VARIETIES USED IN PARTICIPATORY DEMONSTRATIONS



<b>Crop</b>	<b>Varieties</b>
<b>Finger millet</b>	<b>VL-149, VL-146, VL-315, Local</b>
<b>Barnyard millet</b>	<b>PRJ-1, VL-172, Local</b>
<b>Grain Amaranths</b>	<b>PRA-3, VL-44, Durga, Local</b>



# TRAINING ON CROP CULTIVATION AND VERMI COMPOSTING

S. N.	Village & location	No. of Participants	Duration of training (Days)	Participants		Course content
				Male	Female	
1.	Saloor	25+22	5+5	Nil	47	Crop sowing, weeding, row to row distance, vermin-composting.
2.	Paini	20+15	5+5	Nil	35	Crop sowing, weeding, row to row distance, vermin-composting.
3.	Chauki	20+15	5+5	Nil	35	Crop sowing, weeding, row to row distance, vermin-composting.
4.	Nagrasu	20+20	5+5	Nil	40	Crop sowing, weeding, row to row distance, vermin-composting.



**DEMONSTRATION PLOT:-**  
**BARNYARD MILLET**  
**VARIETY-VL-172**  
**VILLAGE:- NAGRASU**  
Organized by:-  
**HESCO/MSSRF/IDRC**



SEED PRODUCTION  
BARNYARD MILLET  
Variety-Vt-172  
HESCO/ISSRF/DRC

FINGER MILLET  
Variety-VL-149  
HES/MSRF/INR





FINGER MILLET  
Variety-VL-515  
H.C.CO/NISRE/DW





AMARANTHUS  
Variety-VL-44  
HESCO/MSSRE/IDRC

A photograph of a field of Amaranthus plants. The plants have green leaves and tall, upright, reddish-purple seed heads. A green sign is placed in the field, providing information about the seed production. The background shows a forested hillside under a cloudy sky.

SEED PRODUCTION  
AMARANTHUS  
Variety-DURGA  
HESCO/MSSRF/IDRC





# DETAILS OF FARMER PARTICIPATORY DEMONSTRATIONS ON AT VILLAGES

Sl No	Variety Used	No of Demos	Range of plot size (ha)	Total area(ha)
<b>Barnyard millet (Village Nagrasu, Rudraparyag)</b>				
1	PRJ 1	18	.02-.050	0.50
2	VL 172	17	.02-.050	0.44
3	Local	5	.02-.050	0.10
<b>Finger millet at Village Chauki, Rudraparyag</b>				
4	VL-149	16	.02-.050	0.48
5	VL-315	11	.02- .050	0.30
6	VL-146	3	.02- .050	0.10
7	Local	5	.02-.050	0.10
<b>Finger millet at Village Paini, Chamoli</b>				
8	VL-149	16	.02- .050	0.40
9	VL-146	5	.02-.050	0.10
10	VL-315	10	.02 -.050	0.25
11	Local	4	.02-.050	0.08
<b>Grain Amaranth at Village Saloor, Chamoli</b>				
12	PRA-3	13	0.01- .050	0.29
13	VL-44	15	0.01-.050	0.34
14	Durga	14	0.01-.050	0.29
15	Local	5	0.01-.050	0.10
	<b>TOTAL</b>	<b>157</b>	<b>--</b>	<b>3.87</b>

# AREA UNDER CULTIVATION

Crop	Previous year (ha)	Current year (ha)	Increase (%)
Finger millet	6.97	8.74	25.39
Barnyard millet	4.07	5.09	25.06
Amaranths	1.96	2.96	51.02

# VERMI COMPOST PITS

There has 67 vermi compost pits been constructed among all adopted villages followed by the training of farmers on compost technology. The major improvement is seen in the productivity of all the millet crops.



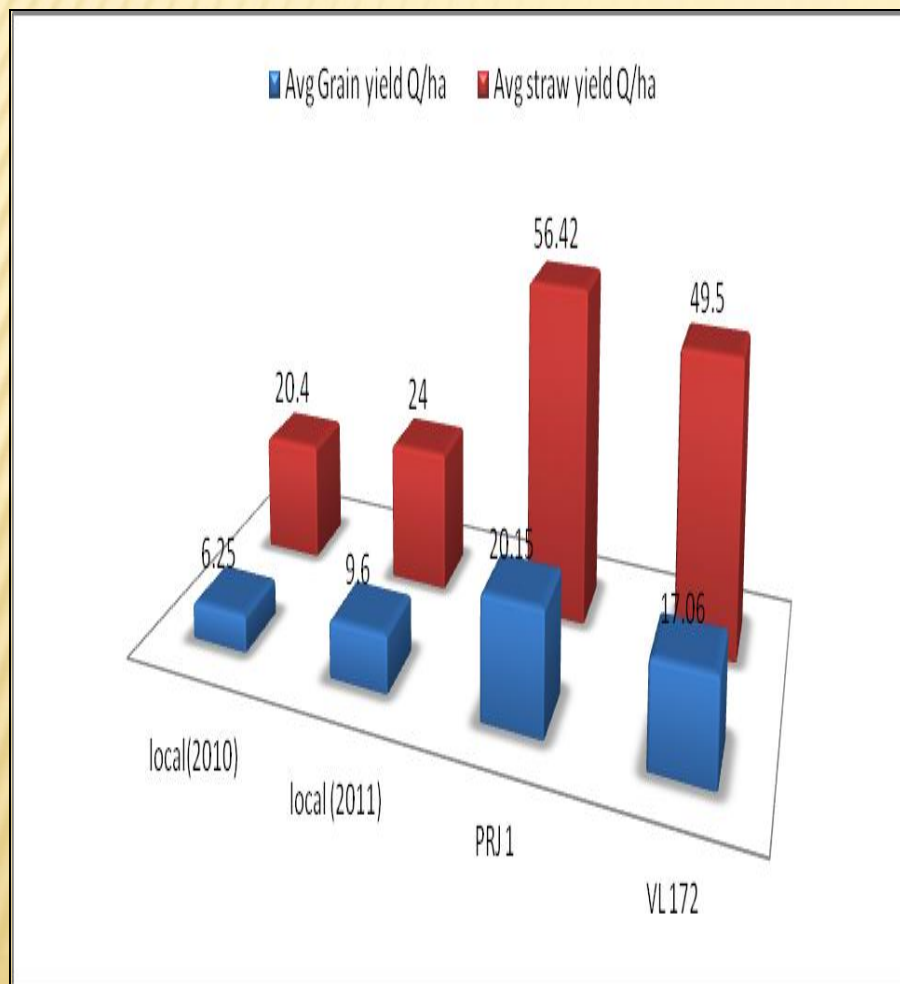
# YIELD PERFORMANCE OF DIFFERENT GENOTYPES IN TRAIL DEMONSTRATION

## Nagrasu (Barnyard Millet)

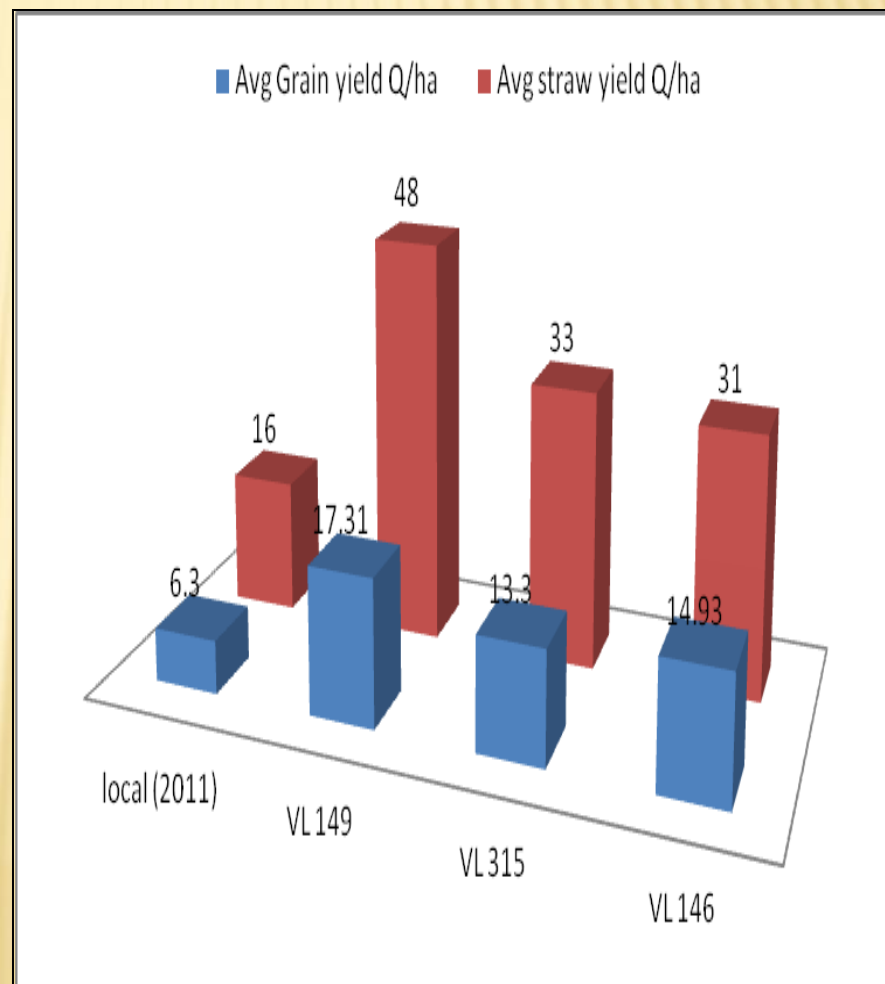
- ❖ In Nagrasu, the productivity of Barnyard millet increased from 6.25 to 9.6 q/ha in local varieties after giving technical inputs.
- ❖ The improved varieties PRJ-1 and VL-172 has significantly produced high yield 20.15 and 17.05 q/ha respectively.
- ❖ Through line sowing the plants get proper nutrition and air, resulting, the straw yield was found increased from 24 q/ha to 52 q/ha approximately.

# PRODUCTIVITY OF MILLET CROP(Q/HA)

## Nagrasu (Barnyard Millet)

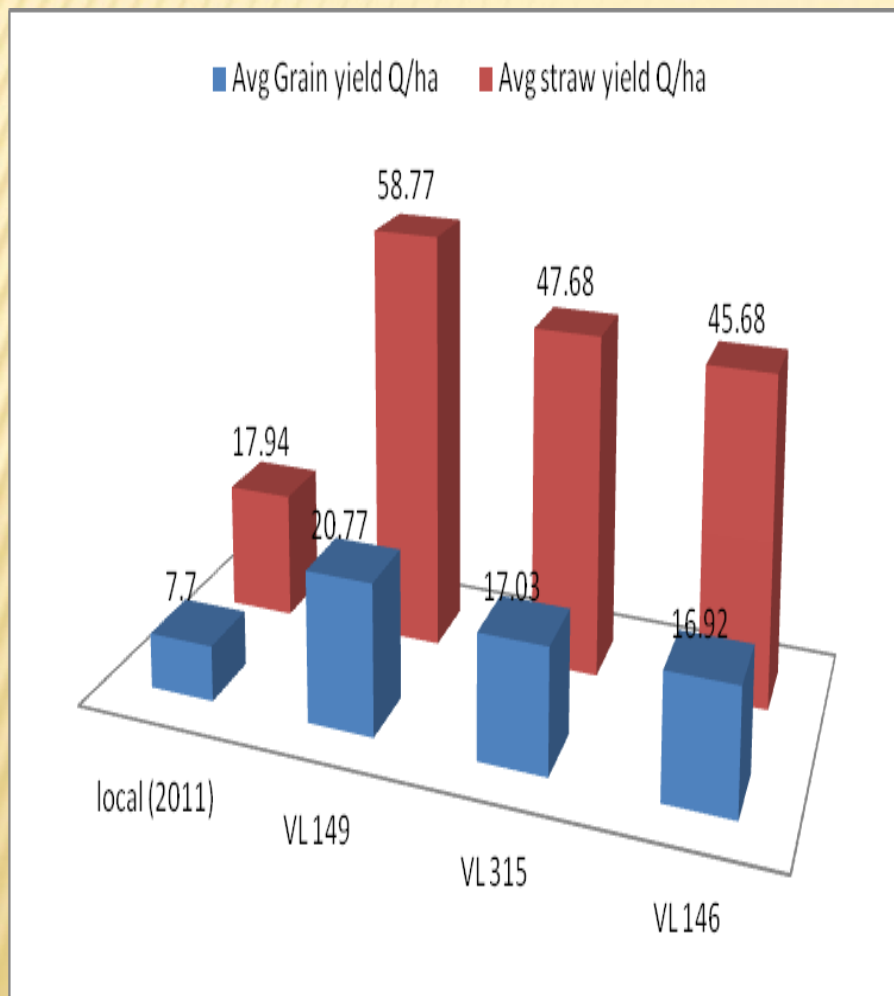


## Chauki (Finger Millet)

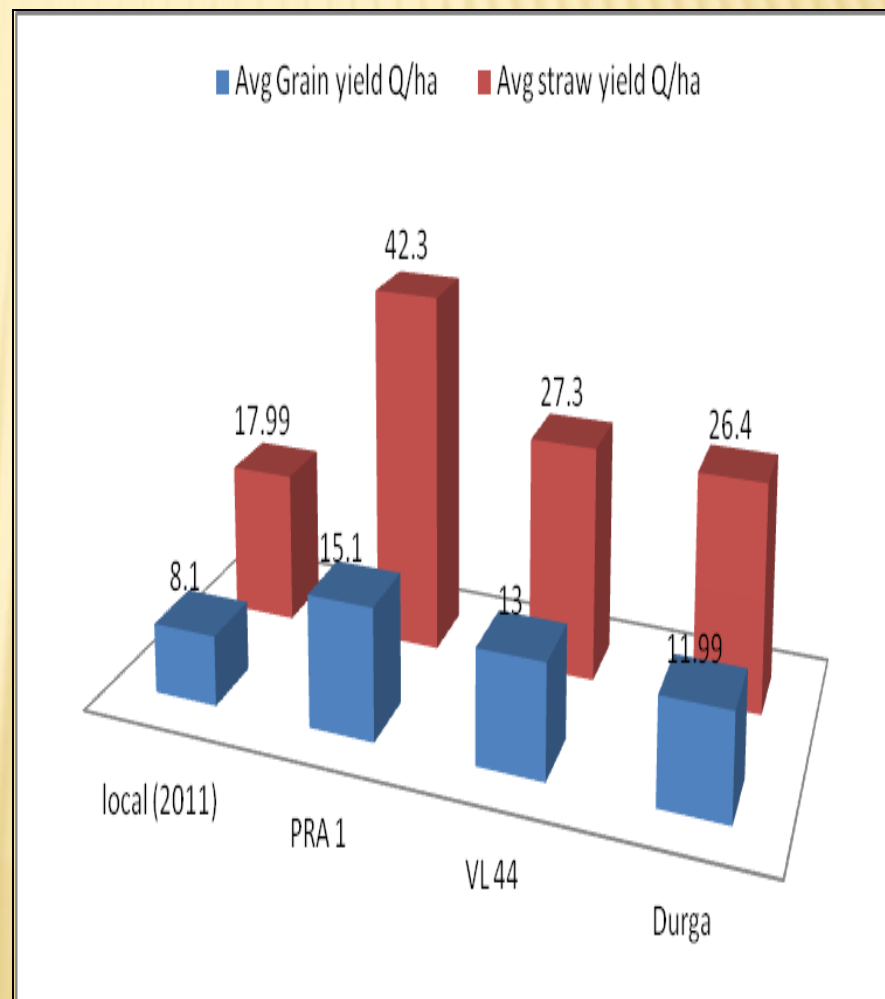


# PRODUCTIVITY OF MILLET CROP(Q/HA)

## Paini (Finger Millet)



## Saloor (Amaranth)



# Chauki (Finger Millet)

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- ❖ The productivity of improved varieties of finger millet was found almost three times more than the local variety.
- ❖ The improved varieties i.e. VL-149, VL-315 and VL-146 showed the significant improvement in grain and straw yield,
- ❖ With the seed treatments, line sowing, and timely weeding enhanced the yield of local variety as well.
- ❖ The improved varieties VL-149, VL-315 and VL-146 produced high grain yield 17.31, 13.30 and 14.93 q/ha respectively.
- ❖ At the same time with line sowing the plants get proper nutrition and air, resulting, the straw yield was increased from 16 q/ha to 44 q/ha approximately.



# Paini (Finger Millet)

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- ❖ The almost same pattern was observed in the **Paini** village.
- ❖ The improved varieties VL-149, VL-315 and VL-146 produced high grain yield 20.77, 17.03 and 16.92 q/ha respectively.
- ❖ With line sowing the plants get proper nutrition and air, resulting, the straw yield was found increased from 17.94 q/ha to 48 q/ha approximately.

# Saloor (Grain Amaranth)

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- ❖ There has been found a visible increase in the productivity of Amaranths, the PRA-3 variety has produced more yield as compare to other varieties.
- ❖ The improved varieties PRA-3, VL-44 and Durga produced high grain yield 15.1, 13.0 and 11.99 q/ha respectively.
- ❖ with line sowing the plants get proper nutrition and air, resulting, the straw yield was found increased comparing local to improved varieties, from 8.06 q/ha to 17.9 q/ha approximately.
- ❖ The grain yield of the local varieties in present year was almost double as compare to previous year which has turned from 4.90 to 8.10 q/ha.

# Effect of vermin compost to enhance the productivity of staple crops:

- ❖ Introduction of vermin compost (50 Kg/Nali) in the fields of the demonstration have shown significant increase in productivity.
- ❖ There has been found 5.02 increase on an average in all villages as a whole in both grain and straw yield.

## Effect of Spacing-cum-seed rate:

- ❖ Through regulating the seed arte and introducing the line sowing pattern in the fields of the demonstration have shown significant increase in productivity.
- ❖ There has been found the 2.75% and 5.25% increase on an average in all villages as a whole in grain and straw yield.

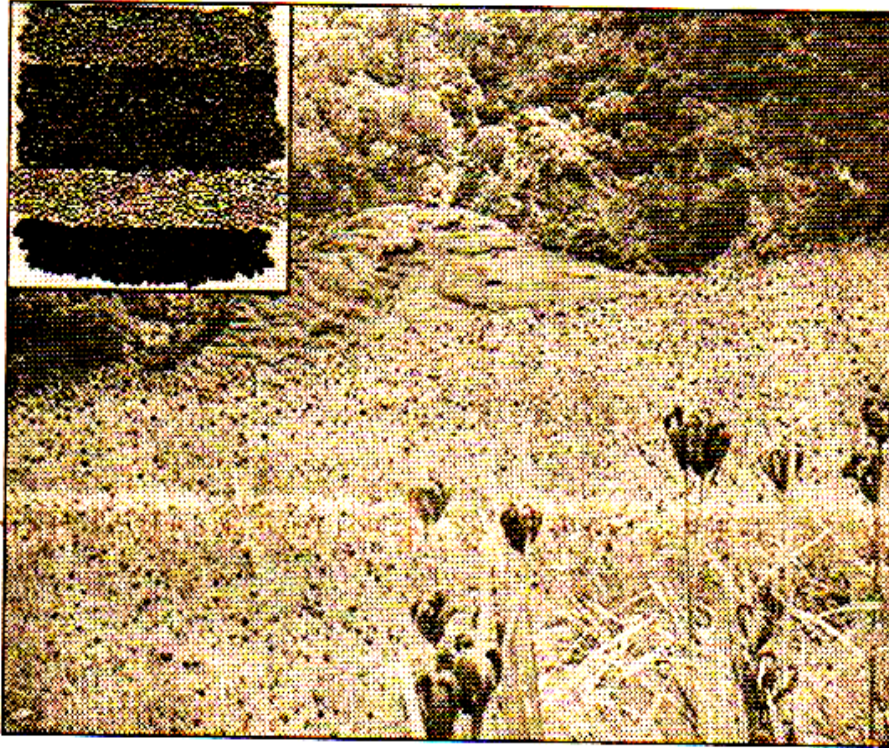
# कोदा, झंगोरा से विदेशी कराएंगे मोटी कमाई

देहरादून (एसएनबी)। सब कुछ ठीक ठाक चला तो विदेशियों की मदद से प्रदेश के पर्वतीय किसान कोदा (मंडुआ), झंगोरा, सांवा (मादिरा), चौलाई जैसे मोटे अनाज से मोटी कमाई कर सकेंगे। प्रदेश के रुद्रप्रयाग जिले में कनाडियन इंटरनेशनल फूड सिक्वोरिटी रिसर्च फंड (सीआईएफएसआरएफ) के तहत इंटरनेशनल डेवलपमेंट रिसर्च सेंटर कनाडियन इंटरनेशनल डेवलपमेंट एजेंसी की मदद से मोटे अनाज का उत्पादन बढ़ाने और उनसे तरह-तरह के उत्पाद बना कर किसानों की आय बढ़ाने की परियोजना शुरू होने वाली है। इस योजना में कनाडा का जेम्स मैकगिल विश्वविद्यालय मोटे अनाज से विभिन्न प्रकार के उत्पाद बनाने की तकनीक विकसित करेगा।

बता दें कि प्रदेश में मंडुआ, सांवा, झंगोरा, चौलाई आदि का उत्पादन इतना नहीं होता कि उसे व्यावसायिक रूप दिया जा सके। कृषि विभाग के आंकड़ों के मुताबिक प्रदेश में 10.9 फीसद कृषि भूमि पर मंडुए की खेती होती है। प्रदेश में मंडुए की उत्पादकता 12.36 कुंतल प्रति हेक्टेयर है जबकि रुद्रप्रयाग में यह 14.58 कुंतल प्रति हेक्टेयर है। सांवा प्रदेश में कुल वुवाई क्षेत्र के 5.4 क्षेत्र में ही बोया जाता है। सांवा की उत्पादकता 10.55 कुंतल प्रति हेक्टेयर जबकि रुद्र प्रयाग में 16.38 कुंतल प्रति हेक्टेयर है। उत्पादकता कम होने से इन पारंपरिक फसलों के खेतों पर पिछले कुछ दशकों से किसान गेहूँ व चावल जैसी फसलों को प्राथमिकता देने लगे हैं जिससे इनका उत्पादन अपेक्षा के अनुरूप नहीं हो रहा। अब कनाडा के जेम्स मैकगिल विवि, कर्नाटक के धारवाड़ स्थित कृषि विवि ने अगले दो साल में

► कनाडा की मदद से हेस्को की देखरेख में उत्तराखंड के रुद्रप्रयाग जिले में शुरू होगी अंतरराष्ट्रीय परियोजना

► कनाडा के जेम्स मैकगिल विश्वविद्यालय, कर्नाटक के कृषि विश्वविद्यालय और चेन्नई के एमएस स्वामीनाथन रिसर्च फाउंडेशन के विश्वज्ञ देंगे मदद



परियोजना चलाकर मंडुआ, झंगोरा आदि के उत्पादन को प्रोत्साहित करने की पहल की है। चार करोड़ रुपये की इस परियोजना को दून स्थित गैर सरकारी संगठन हिमालयन एन्वायरमेंटल स्टडीज एंड कंजर्वेशन ऑर्गेनाइजेशन (हेस्को), धारवाड़ का कृषि विवि, एमएस स्वामीनाथन रिसर्च फाउंडेशन (एमएसएसआरएफ, चेन्नई) क्रियान्वित करेंगे। 'स्ट्रेथनिंग ऑफ रूरल फैमिलीज थ्रू इंपावरमेंट बाय इंटीग्रेटिव फूड

सिक्वोरिटी थ्रू प्रोडक्शन, प्रोसेसिंग एंड वैल्यू एडिशन ऑफ रीजनल स्टेपल फूडग्रेन्स' नामक इस परियोजना के तहत प्रदेश के रुद्रप्रयाग जिले, कर्नाटक के हवेरी, तमिलनाडु के नमक्कल और उड़ीसा के कोरापुट जिले में मोटे अनाज की खेती के जरिए किसानों की आय बढ़ाने को प्रोत्साहन दिया जाएगा। ग्रामीण तकनीक के क्षेत्र में उल्लेखनीय कार्य कर चुके हेस्को के संस्थापक डा. अनिल प्रकाश जोशी का कहना है कि यह बहुत चिंता की बात है कि उत्तराखंड में चावल और गेहूँ की आसान उपलब्धता के कारण मोटे अनाज का उत्पादन गिरा है। उनका कहना है कि मोटे अनाज में जबकि ज्यादा पौष्टिक तत्व होते हैं और वह मधुमेह रोकने में भी फायदेमंद है। उनका कहना है कि इन मोटे अनाजों की अब विदेशों में भी काफी मांग बढ़ रही है। ऐसे में अगर प्रदेश में किसानों को इन फसलों का उत्पादन बढ़ाने के लिए प्रेरित किया जाए और उन्हें उत्पादन बढ़ाने के वैज्ञानिक तौर तरीके सिखाए जाएं तो पारंपरिक फसलों को बचाने में मदद मिलेगी।

उनका कहना है कि किसान इन फसलों की ओर फिर से तभी आकर्षित होंगे जब उनकी

इनसे कुछ बेहतर आय हो। इसलिए परियोजना के तहत इन मोटे अनाजों से उत्पादों में विविधता लाने का प्रयास किया जाएगा। यही नहीं इन फसलों को उगाने से लेकर फसलों की कटाई तक के लिए विशेष तकनीकों व उपकरणों का विकास किया जाएगा। इतना ही नहीं उनके उत्पादों को बनाने के लिए उपकरण भी विकसित किए जा सकते हैं मसलन गेहूँ की रोटी बनाने वाली मशीन की तरह मंडुआ की रोटी बनाने वाली मशीन आदि।

# ECONOMIC BENEFITS

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- ❖ Implementation of the project has led to increase in income of villagers by **Rs. 1339.00** (spread over the duration of four months which is considered as from crop sowing to post harvesting).
- ❖ This will make them more independent and open to adopt new technologies and practices.
- ❖ Apart from this, it can help to set an example for nearby communities to engage them in such income generation activities.

# **PART II**

## **PROCESSING AND VALUE ADDITION OF REGIONAL STAPLE FOOD GRAINS IN INDIA**

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# WHY WE NEEDED THE VALUE ADDITION

- ✘ The training programmes were conducted to aware the local women about the present status, and their power and capabilities, through which the can easily earn some money for their own families. The major things were discussed:
  - + We are richest in resources but poorest in use.
  - + We do not have the transportation facilities. In some cases 20 -30 % goes waste due to unavailability of transportation .
  - + Main profit goes to the middle man.
  - + Products which we buy from the market can be prepared by ourselves as well.
  - + Survey revealed that 90-95% products of daily needs comes from outside.
  - + 75-80% can be made locally as the raw material is available.
  - + Tourist places and religious places are available in each district of Uttarakhand, where thousands of pilgrims/tourist come down every year.

# LIST OF MILLET PRODUCTS DEVELOPED

Sl. No.	Name of the millet	Name of the product
1	Finger Millet	1. Laddoo, 2. Namkeen 3. Nutri Cake 4. Biscuits
2	Barnyard Millet	1. Halwa 2. Chachera 3. Kheer 4. Upma 5. Dosa 6. Idly 7. Papad 8. Masoor pak
3	Amaranths	1. Chikky bar 2. Health Mix Drink 3. Breakfast 4. Chapati 5. Laddoo



# TRAINING ON MARKETING THE PRODUCTS AND STRATEGIES

S.N.	Village & location	No. of Participants	Duration of training (Days)	Course content
1.	Saloor	20	5	Packing, packaging, product presentation
2.	Paini	20	5	Packing, packaging, product presentation
3.	Chauki	20	5	Packing, packaging, product presentation
4.	Nagrasu	20	5	Packing, packaging, product presentation
	<b>Total</b>	<b>80</b>	<b>20</b>	





TRAINING ON  
VALUE ADDITION IN MILLETS  
VILLAGE : PAINI DATED: 24-05-2011  
ORGANIZED BY  
HESCO MSSRF IDRC

# COMMUNITY CENTER

- Two community centers one in Khameda and the other in Paini, were established and all members of the associated women SHGs were trained on value addition and product development.



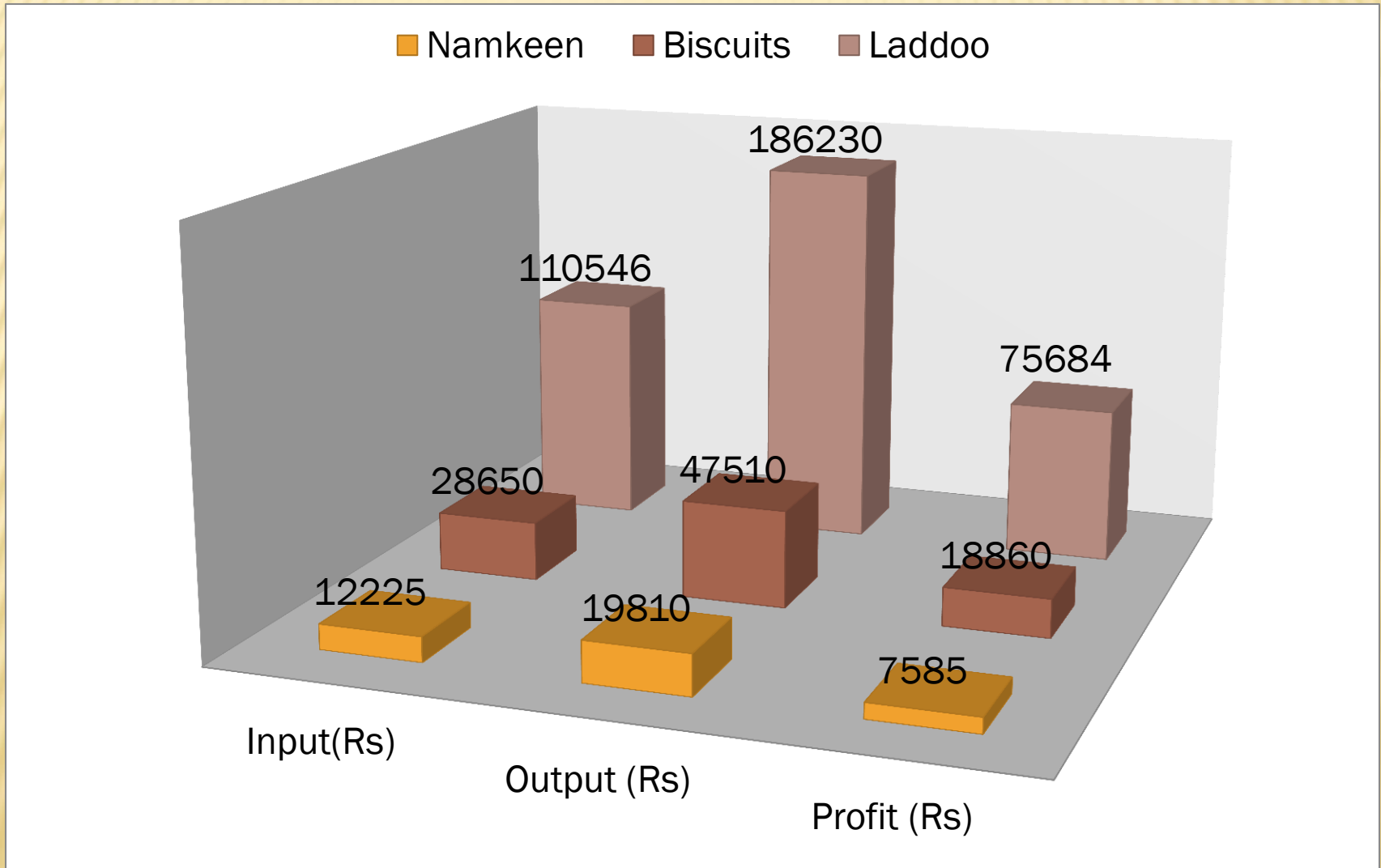
# MARKET LINKAGES FOR VALUE ADDED PRODUCTS

Sl.No.	Market Linkage	Type
1	Exhibitions	Direct selling
2	Retail shops (outlets in Kameda and Paini)	Direct sell
3	Self Selling	Direct selling
4	Temple Committee	The outlets were established in Badrinath and Kedarnath. The Laddoo are being used as the Prasadam

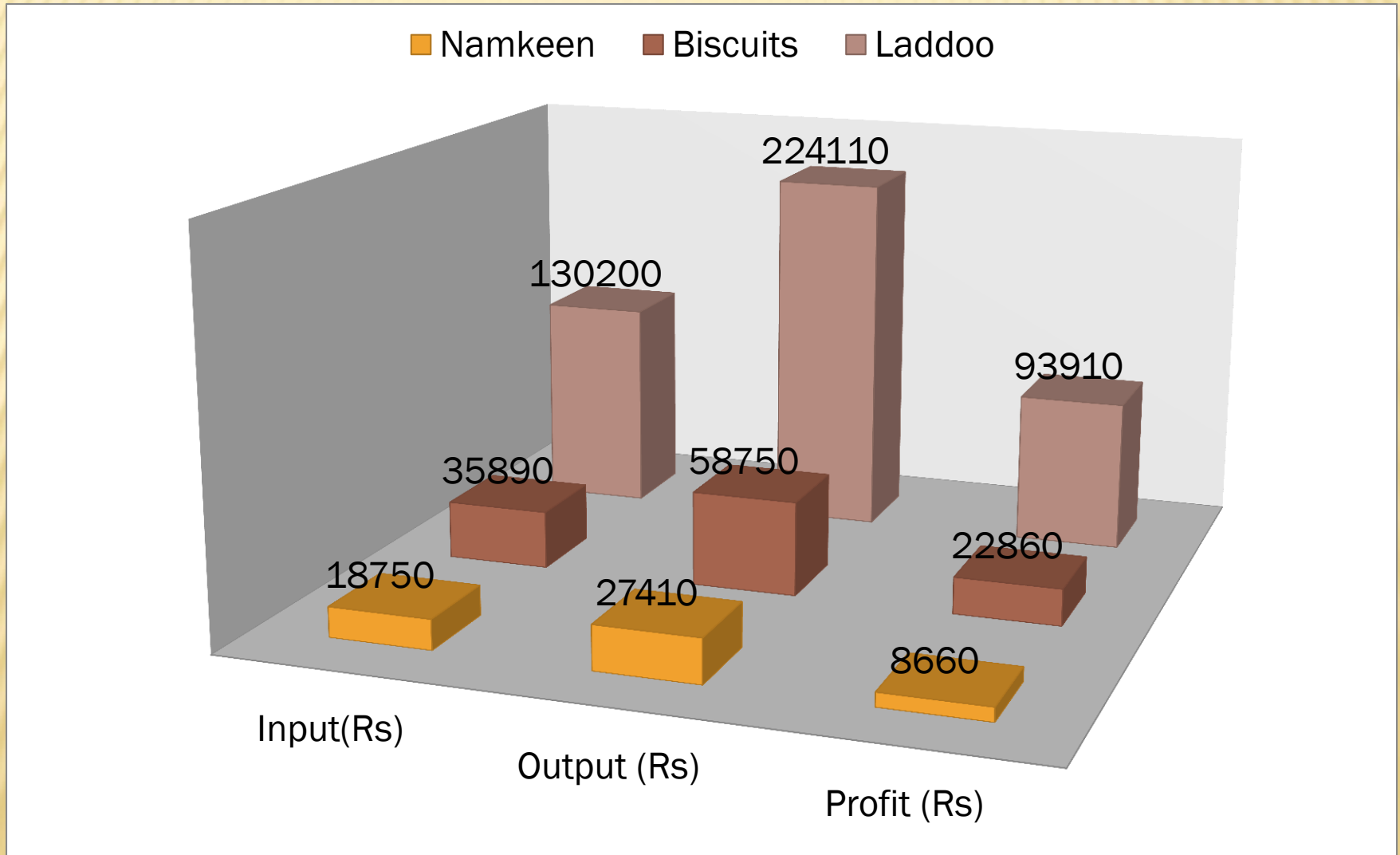
# COST BENEFITS ANALYSIS FROM THE VALUE ADDITION OF THE PRODUCE

Center (Villages)	Products	Quantity produced (kg)	no. of hours required to produce	Input (Rs)	Output (Rs)	Profit (Rs)	women in group	income per woman (Rs)	Employ ment created for no. of days (8hrs/ day)
Kameda (Nagrasu+ Chauki)	Laddoo	1693	560	110546	186230	75684	18	4205	70
	Biscuits	358	100	28650	47510	18860	18	1048	12.5
	Namkeen	132	16	12225	19810	7585	18	421	2
Paini (Paini+ Saloor)	Ladoo	2037	570	130200	224110	93910	20	4696	71.2
	Biscuits	734	32	35890	58750	22860	20	1143	4
	Namkeen	182	20	18750	27410	8660	20	433	2.5

# TOTAL ECONOMICS OF KAMEDA CENTER



# TOTAL ECONOMICS OF PAINI CENTER





# PART III

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## DRUDGERY REDUCTION

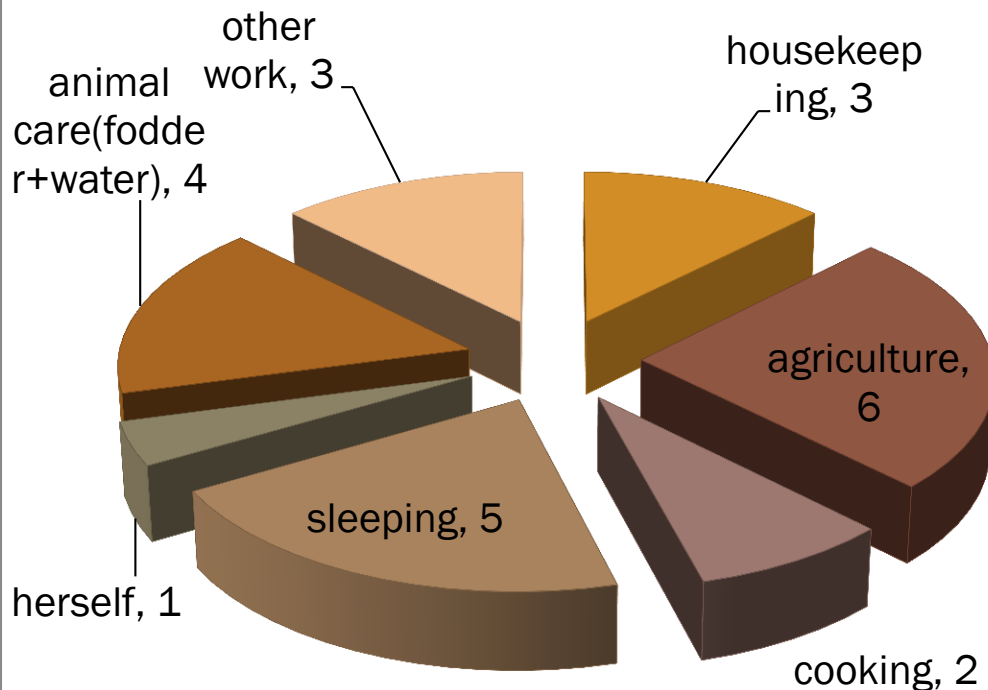
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**TECHNOLOGICAL SOLUTIONS FOR  
REDUCTION OF DRUDGERY IN CROP AND  
POST-HARVEST MANAGEMENT OF MILLET  
UNDER HESCO**

# STATUS

## TIME DISTRIBUTION (24 HOURS) OF WOMEN IN AREA

Hilly women are burdened from childhood with relentless, household drudgery and later reproductive roles. A normal day revolves around provisioning for firewood, farming, fetching water demands, cooking and related work. Access to affordable technology reduces drudgery and saves time. This “frees” them for social and economic activities. Energy efficient technology radically changes her life.



# MAJOR OBJECTIVES OF DRUDGERY REDUCTION IN HILLS OF UTTARAKHAND

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- ✘ To enhance the productive participation of women in agriculture.
- ✘ To create sustainable agricultural livelihood opportunities for women in agriculture.
- ✘ To improve the skills and capabilities of women in agriculture to support farm and non-farm-based activities.
- ✘ To ensure food and nutrition security at the household level.
- ✘ To enable women to have better access to inputs and services for their upliftment.
- ✘ To improve the capacities of women in agriculture to access the







# TOOLS AND EQUIPMENTS

Women friendly machinery / tools were introduced to minimize the drudgery in certain agricultural operational.

During the survey, it was observed that women face the drudgery during manual harvesting and processing of these crops. To minimize the drudgery in harvesting and processing of selected crops help was sought from VPKAS, Almora. The equipments were placed for millets and grain amaranth threshers after satisfactory performance.

Threshers were provided to one at Chauki (Nagrasu) and other one at Paini (Saloor) according to convenience of the farmers. The villagers of Nagrasu also getting benefit from thresher of Chauki village and like the same saloor's farmers using the thresher of Chauki village.

The bakery oven, grinder and other accessories were given to the farmers to reduce the drudgery.





Thresher for Finger millet & Barnyard millet.

Capacity : 40-60 kg/hrs.

Cost: Rs.14,500/-

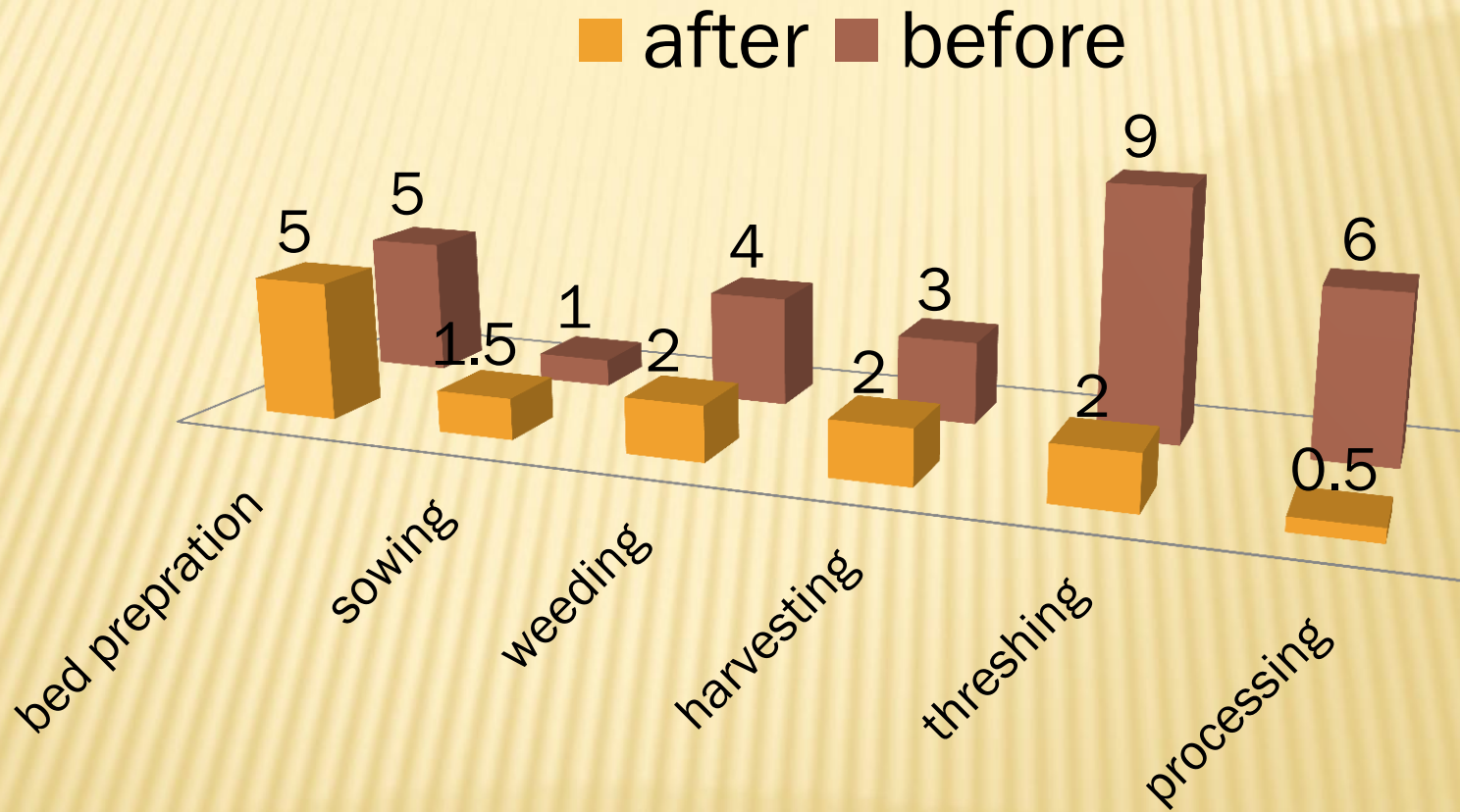
# Thresher for Grain Amaranths

Capacity : 20-30 kg/hr

Cost: Rs.15,000/-

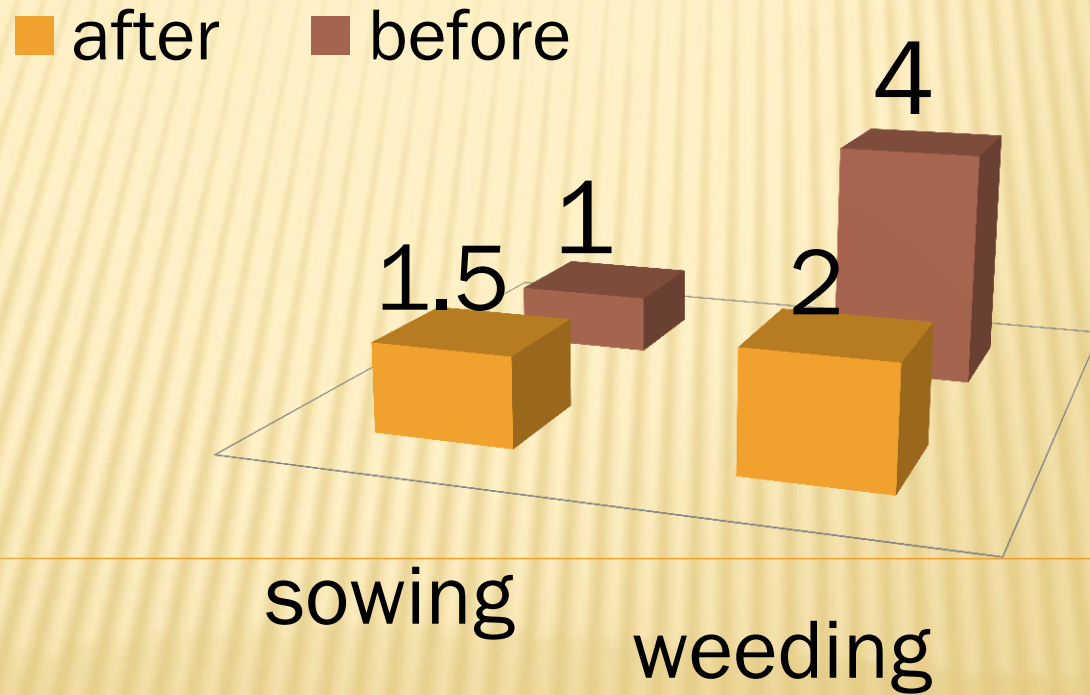


# TIME CONSUMPTION(HRS) IN DIFFERENT ACTIVITIES PRIOR TO TECHNICAL AND LATER



# EFFECT OF SPACING-CUM-SEED RATE

Through regulating the seed rate and introducing the line sowing pattern in the fields, reducing the time in the due to easy operating weeding.



# FLOUR MILL

Two flour mill, in Paini and Saloor, considering the non availability of the mill in the respective villages were installed. After installation of the mills in these villages, farmers are pleased with the easy approachability and less time consuming.

Villages	Time consumption before the introduction of flour mill/q	Time consumption after the introduction of flour mill /q	Time saving	Labour saving (Rs)
Chauki (Nagrasu)	24 hours	2 hours	22 hours	2400
Paini (Saloor)	24 hours	2 hours	22 hours	2400





THANK  
YOU .....