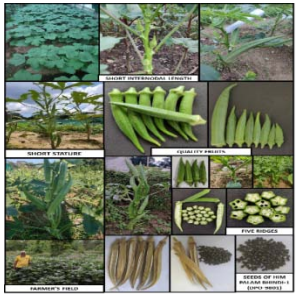
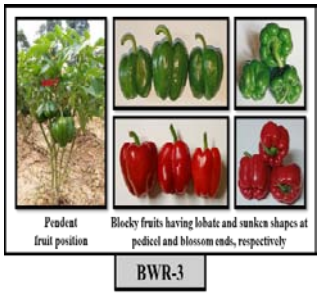
19th RESEARCH COUNCIL MEETING
(January 21, 2025)







CSK HP Krishi Vishvavidyalaya
Palampur – 176062 (H.P.)

☞AGENDA ITEMS

1. To confirm the proceedings of 18th meeting of the Research Council held on January 30, 2023
2. To report action taken on the decisions of 18th meeting of the Research Council
3. To present the highlights of research work done from January 31, 2023 to date
4. To place before the Council the list of research projects sanctioned since last meeting (January 31, 2023to date)
5. To place before the Council the abstracts of Ph.D. theses submitted and approved since last meeting (January 31, 2023 to date)
6. New items put forth by the Hon'ble members of the Research Council
7. Any other item (s) with the permission of the Chair

ITEM No. 1

☑ To confirm the proceedings of the 18th meeting of the Research Council held on January 30, 2023.

ITEM No. 2

ACTION TAKEN

on the

RESEARCHABLE ISSUES

Proposed by

The Hon'ble Research Council members

In the 18th Meeting

Director-cum-Warden of Fisheries

Bilaspur

☞ ISSUE 1.

Identifying suitable fish varieties for stocking in High altitude lakes in HP

Action:

- A suggestion for collaborative project proposal + furnish list of high-altitude lakes to be utilized, was given to the state Fisheries department w.r.t letter No. QSD. DR-CSKHPKV/3-1 (Tech)/ 1464-66 dated 23.05.2023. Response is awaited.

☞ ISSUE 2.

Evolving breeding technology of indigenous snow trout for replenishing natural stock in state rivers

Action:

- **Machiyaal fish farm** was visited by two scientists of the Department of Fisheries CSKHPKV Palampur on 03.07.2023 to see the feasibility of research work to be done.
- A project proposal was submitted to the State Department on captive breeding and seed production of snow trout in Himachal Pradesh along with MOU vide letter No. QSD. DR-CSKHPKV/3-1 (Tech)/ 1464-66 dated 23.05.2023.
- A virtual meeting was fixed between both the departments to discuss the detail project plans on 07.11.2023. It was concluded in the meeting to resubmit the proposal with changes discussed in the meeting along with MOU.
- The **detailed project with modification and MOU** was again resubmitted (letter No. QSD. DR-CSKHPKV/3-1 (Tech)/7028-29 dated 12.12.2023). Response is awaited.

☞ ISSUE 3

Developing formula of low-cost Trout feed using local ingredients

Action:

- ✓ A project proposal with respect to this issue has been submitted vide letter No. QSD. DR-CSKHPKV/3-1 (Tech)/ 1464-66 dated 23.05.2023. Response is awaited.

Dean-DGCN COVAS, CSKHPKV

Palampur

1. **Impact of climate change on production and reproduction of livestock of Himachal Pradesh:**
2. **Research on Herbal Plants**
3. **Studies on Parasitic Diseases**

During discussion, the Department of Animal Husbandry was requested for providing financial support to address the above issues.

➔ Action taken:

➢ Project Proposals submitted to the DoAH

Sr. No.	Project Title	Principal Investigator	Budget Outlay (Rs. in lakh)
1.	Baseline studies for impact of climate change on production and reproduction of livestock in Himachal Pradesh	Dr. Krishnender Dinesh, Asstt. Professor, Department of Animal Genetics and Breeding	27.77
2.	Pharmacological evaluation of medicinal properties of herbal plants used in ethno-veterinary medicine in Himachal Pradesh	Dr. Pallavi Bahrdwaj, Asstt. Professor, Department of Veterinary Pharmacology & Toxicology	55.00
3.	Gastrointestinal parasitism and threat of reduced efficacy of benzimidazole drugs in Gaddi sheep-Intervention, strategies and headway options for enhancing health productivity	Dr. Devina Sharma, Asstt. Professor, Department of Veterinary Parasitology	25.00

- **It has been intimated that there is no provision of funds at Government level for the project proposals so submitted and it was advised to seek financial assistance from NLM under Innovation and Extension component. The concerned scientists have been directed to explore possibility for submission of the above-mentioned proposals under National Livestock Mission for financial assistance.**

Dr. Ravi Prakash, Joint Director

(represented Director-Animal Husbandry)

The issue of infertility in cattle should be monitored on project basis/Ph.D thesis research work

➔Action taken:

- ✓ The Department of Veterinary Gynaecology & Obstetrics is regularly undertaking work on infertility management of cattle of the state.
- ✓ Till date Seven projects on this aspect have been completed by the Department with financial assistance under RKVY starting from the year 2009.
- ✓ More than 700 clinical camps were organized in all districts of the state and approximately 8000 bovines were treated for infertility.
- ✓ The department is regularly planning and executing large animal reproduction based work in form of M.V.Sc./Ph.D. problems and during last five years 14 post graduate students have worked on this aspect.

Dr. Mandeep Sharma

(Dean-DGCN COVAS)

Need of a PAHARI COW FARM in the State

➔Action taken:

- ✓ As per communication received from the Director, Animal Husbandry a project on **"Conservation and Propagation of Himachali Pahari Cattle"** under **Rashtriya Gokul Mission** has been approved by the GOI with budget of Rs. 4,64,00,000/-
- ✓ The Farm for Conservation and propagation of Himachali Pahari Cattle of Himachal Pradesh is being established at **Cattle Breeding Farm, Bagthen, Distt. Sirmour.**

Registration of Gaddi Dog

➔Action taken:

- ✓The Gaddi Dog of Himachal Pradesh has been registered with ICAR-National Bureau of Animal Genetic Resources (NBAGR), Karnal
- ✓**Accession Number: India_DOG_0600_Gaddi_19004.**

Funding on AH component under RKVY stopped? If so, the Department of Animal Husbandry should keep some funds for research

➔Action taken:

- ✓ Department of Animal Husbandry is providing grant-in-aid under non-salary head for research activities on priority areas of research since 2021-22.
- ✓ During last year (2023-24) also grant-in-aid amounting to Rs. 38.00 lakh has been provided for adhoc project entitled "Establishment of artificial intelligence-based milking parlor in University Dairy Farm augmented Robotic Milking Machine equipped with Sensors" which is in operation in the Department of Livestock Farm Complex.

Dr. Amar Singh Kapoor

(Hon’ble Member)

Hybrids of cauliflowers released from the University

➔Action taken:

- ✓Two new hybrids of cauliflower viz., Him Palam Phool Gobhi Hybrid-1 and Him Palam Phool Gobhi Hybrid-2 have been developed by Department of Vegetable Science and Floriculture.
- ✓ Approved in the recently held Agricultural Officers' Workshop on Vegetable Crops on 4th May, 2024 at CSKHPKV, Palampur.
- ✓ Submitted to State Variety Release Committee for release for cultivation in the State.

Possibility of growing blue berry in zone IV of the state.

➔Action taken:

- ✓ Department of Horticulture, CSKHPKV, Palampur is conducting research on blueberry. Work on the standardization of package of practices of blue berry and its multiplication is in progress
- ✓ A new project "Creation of facilities for modern nursery production unit for supplying virus free quality planting materials of important sub-tropical fruits including blueberries" worth **Rs. 45.20 lakh has been approved under** RKVY
- ✓ Another project "Exploring the Potentials of Blueberry Cultivation in H.P. for income upliftment of farmers" with budget outlay of Rs. 33.50 lakh has recently been submitted to the Secretary (Agri.) to the Govt. of H.P.

Sh. Lekh Raj Rana

(Outstanding Social Worker)

Alternative crops and measures to mitigate the menace of wild animals

➔Action taken:

✓ **Alternative crops:**

- Elephant foot yam (Zimikand), okra, ginger, turmeric, chilli, sarson (least attacked by wild and stray animals)
- Medicinal/aromatic plants like tulsi, lemon grass, aloevera, sarpgandha, marigold etc. can also be grown
- Besides, in monkey prone area, fodder crops including some perennial fodder grasses like Napier bajra hybrid, setaria, Guinea grass, clovers etc. (as per the suitability of the agroclimatic zone), can be planted

✓ **Other measures:**

- Electric as well as wire fences.
- **Mukhya Mantri Khet Sanrakshan Yojna**: under subsidy of 85% for fencing (community basis) and 80% subsidy (individual land)

Dr. Raghubir Singh-Joint Director

(represented Director-Agriculture)

✍ Package of practices for natural farming are required

➔Action taken:

- Adhoc Package of Practices for Crop Cultivation under Natural Farming Conditions have been developed.
- Recommended by Research Evaluation Committee; approved in the Agricultural Officers' Workshop on rabi crops-2024
- Submitted to the State Project Implementation Unit (SPIU)-Prakritik Kheti Khushhal Kisan Yojna (PK3Y).

Dr. Inder Dev-Director of Extension Education

(Represented Director of Research-UHF, Solan)

- Need to work on various IPR related issues (trademarks, copyright, GI, patent, etc.). He also highlighted the importance of collaboration of different institutes for such issues.

➔Action taken:

- GI application in respect of japonica red rice of H.P. has been filed with Registrar, GI Registry, IPR Office, Chennai in June, 2021.
- GI task forces constituted for crops/products viz., Rice, Maize, Wheat, Barley, Ginger, Rajmash, Mash, Kulthi, Seabuckthorn, Millets (Ragi, Kangni, Cheena and Swank), White Honey, Zimikand, Nadauni Mooli, Gandyali, Foxtail Orchids, Gaddi dog, Spiti Poni, Tissa Poni and pashmina Chegu, Red Jungal Fowl, Textile Products of CoCs, Kinnauri Chulli and Moori etc.
- Three projects of GI information on Red Rice, Chamba Chukh and Karsog Kulthi completed. Information/Report submitted to HIMCOSTE Shimla
- A Memorandum of Understanding between CSKHPKV, Palampur and Dr. YSP UHF, Solan for fostering academic and research cooperation for exchange of students for PG Degree Programme, joint research programmes, conferences, seminars, workshops and faculty exchange has been made on 31st July, 2024

Dr. (Mrs.) Kavita Sharma

(Pr. Extension Specialist, KVK Sundernagar-CSKHPKV)

Development of Package of Practice in the field of Community Science

➔Action taken:

The PoPs for Technologies on Community Science are in final stages of preparation and will be published very soon after finalization in the Workshop.

Dr. Satish Guleria

(Hon’ble Member)

✍ Need of Central Quality Testing Laboratory in the University for analyzing different quality parameters required for release of new varieties

➔Action taken:

- **A project proposal "Establishing quality testing laboratory for nutritional evaluation of crop varieties" with budget outlay of Rs. 60.00 lakhs approved by the State Level Sanctioning Committee of RKVY in its meeting held on 4th April, 2024 for financial assistance for the year 2024-25. However, the funds for the same were not released.**

- **Now, the same proposal with enhanced budget outlay of Rs. 95.00 lakhs has again been submitted under RKVY CAFETARIA for financial assistance during the financial year 2025-26.**

ITEM No. 3.

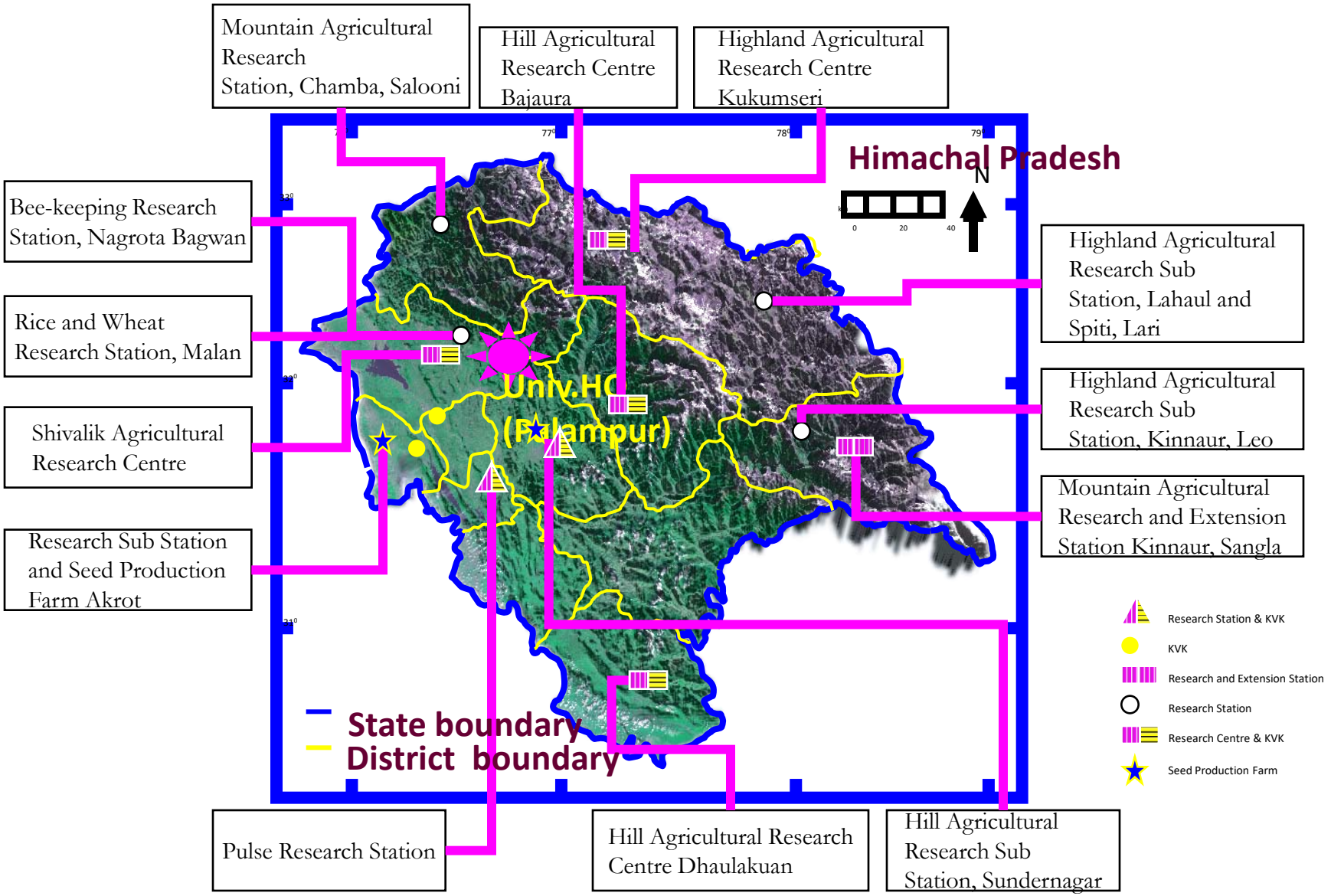
PRESENTATION OF RESEARH HIGHLIGHTS (w.e.f. January 31, 2023)

☞Research Network

Infrastructure

- ✓ Directorate of Research
- ✓ **40 Specialized Departments**
- ✓ 13 Regional Research Stations and Research Sub-stations
- ✓ 2 Centres of Teaching, Research & Extension

Agricultural Research Centres: 13 Across the State



AGRICULTURE

New Varieties Released (Notified by CVRC)

Cereals, oilseeds and Forage Crops = 6	
Rice	**Him Palam Dhan-3 & Him Palam Dhan-4**
Maize	**Him Palam Composite-2**
Soybean	**Him Palam Soya-1**
Gobhi Sarson	**Him Palam Gobhi Sarson-2**
Forage Oat	**Him Palam Oat-1**

New Varieties (CVRC)

Him Palam Maize Composite 2

Him Palam Dhan 3

Him Palam Dhan 4

Him Palam Soya 1

Him Palam Gobhi Sarson 2

Him Palam Oat 1

New Varieties/Hybrids Developed- Recommended by REC, Approved in AOW and Submitted to SVRC

Cereals=2 & Vegetable Crops= 14

Maize	Him Palam Sankar Makka 3
Wheat	Trombay Him Palam Gehun 4
Okra	Him Palam Bhindi 1
Cauliflower	Him Palam Phool Gobhi Hybrid 1 & Him Palam Phool Gobhi Hybrid 2
Tomato	Him Palam Tamatar 1 & Him Palam Tamatar 2
Garden Pea	Him Palam Matar-3
Capsicum	Him Palam Shimla Mirch 1 & Hima Palam Shimla Mirch 2
Chilli	Him Palam Chilli Hybrid 1, Him Palam Chilli Hybrid 2 & Him Palam Chilli Hybrid 3
Yellow Capsicum	Him Palam Yellow Capsicum-1
Cherry Tomato	Him Palam Red Cherry Tomato
Capsicum Paprika	Him Palam Capsicum Paprika 1

New Varieties (SVRC Submitted)

Him Palam Sankar Makka 3

Trombay Him Palam Gehun 4

Him Palam Matar 3

Him Palam Phoolgobhi Hybrid 1

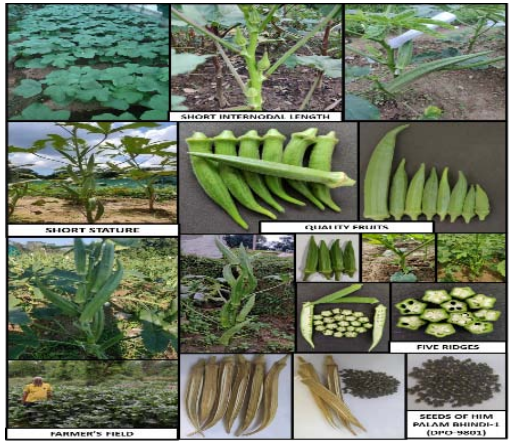
Him Palam Phoolgobhi Hybrid 2

Him Palam Chilli Hybrid 1

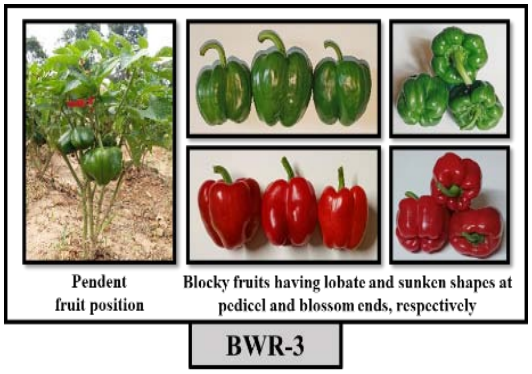
New Varieties (SVRC Submitted)

Him Palam Chilli Hybrid 2

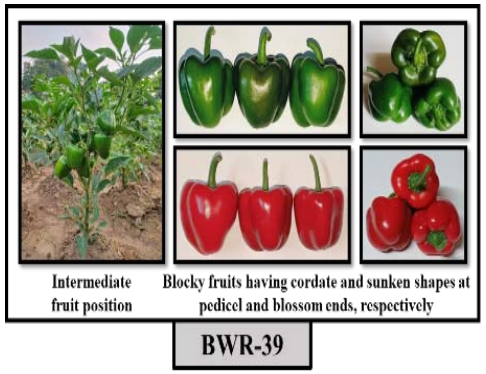
Him Palam Chilli Hybrid 3



Him Palam Bhindi 1



Him Palam Shimla Mirch 1



Him Palam Shimla Mirch 2

Him Palam Capsicum Paprika 1

New Varieties (SVRC Submitted)

Him Palam Tamatar 1

Him Palam Tamatar 2

Him Palam Yellow Capsicum 1

Him Palam Red Cherry

☞Seed Production

About 800 quintals of Breeder seed and 250 quintals of Foundation seed was produced

Technologies Developed

Title of the product/variety/process developed
▪ Management of late blight of tomato caused by *Phytophthora infestans*
▪ Management of Early blight of tomato caused by *Alternaria solani*
▪ Management of Buckeye rot of tomato caused by *Phytophthora nicotianae* var. *parasitica*
▪ Management of Purple blotch of onion caused by *Alternaria porri*
▪ Management of Stemphylium blight of onion caused by *Stemphylium vasicarium*
▪ Weed management in maize

Technologies Developed (Cont…..)

Title of the product/variety/process developed
✓ Spacing in fodder oat
✓ Integrated management of greenhouse whitefly in tomato (Supplementary Proposal)
✓ Management of brinjal shoot and fruit borer
✓ Adhoc recommendation of Leaf type varieties of lettuce suitable for hydroponic system
✓ Seed Rate of Tomato, Capsicum & Cucumber under protected conditions
✓ Package of Practices for crop cultivation under natural farming

Technologies Commercialized

Technology/ Variety	Commercialization status (MoUs for seed production and marketing)	Income generated (Rs. in lakh)
Garden Pea - **Him Palam Matar 1**	M/S. K.D. Farm House, Sundernagar, Distt. Mandi (HP)	1.00
	M/S. Suttind Seeds Pvt. Ltd., Delhi	1.00
	M/S. ACSEN Agriscience Pvt. Ltd., Bengaluru	1.00
	M/S. Sharma Enterprises, Theog, Shimla	2.00
	M/S. Pramaanit Seeds Pvt. Limited, Khodsama	2.00
Garden Pea - **Him Palam Matar 2**	M/S. K.D. Farm House, Sundernagar, Distt. Mandi (HP)	1.00
	M/S. Durga Seeds Farm, Ner-Chowk, Distt. Mandi (HP)	1.00
Rye grass - **Him Palam Rye Grass 1**	M/S. Hanstech Seeds Pvt. Ltd., Chatanyapuri, Hyderabad	1.00
Total		**10.00**

Registration of Crop varieties with PPV& FRA

CSKHPKV Developed Varieties

Sr. No.	Crop	Variety (Year)
1.	Rice	Him Palam Dhan 3 (2024)
		Him Palam Dhan 4 (2024)
2.	Barley	Him Palam Jau 1 (2023)

Farmers' Varieties

Sr. No.	Crop	Variety (Distt.)
1.	Rice	Kalijhini (Kangra)
		Jattu (Kullu)
		Matali (Kullu)
2.	Maize	Talaw Makki (Mandi)

Awards and Honours

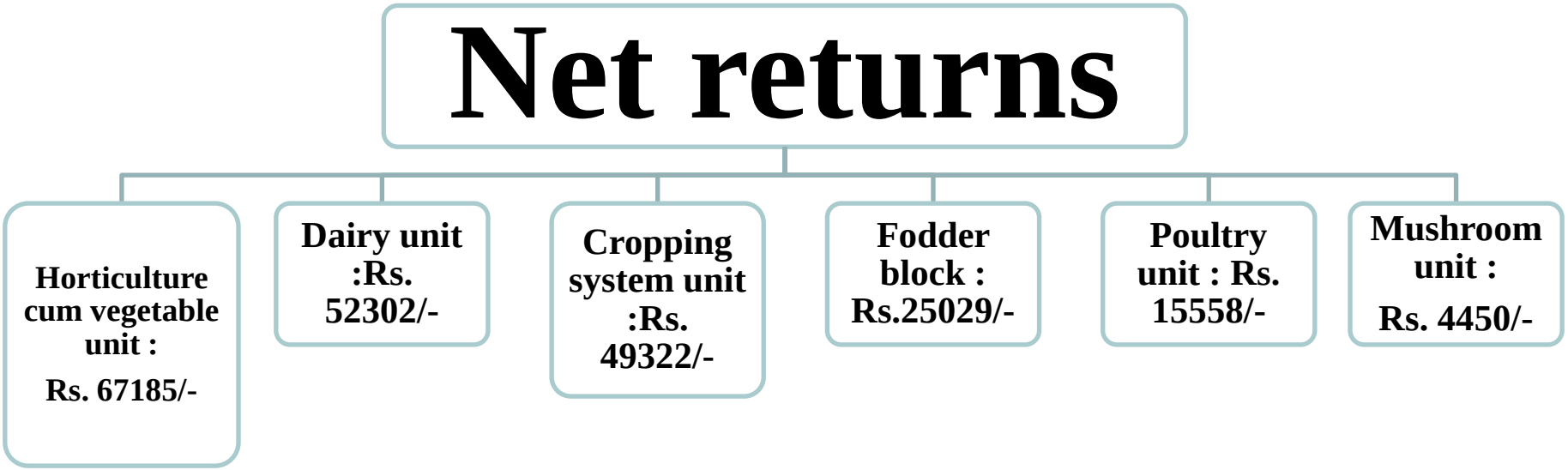
Name/ Particulars	Award details
Farmers of Shong Valley, Kinnaur district	**Plant Genome Saviour Community Award:** For conservation of **Kala Zeera** and the award was received on 12.09.2023 (Rs. 10 Lakhs) by PPV&FRA, New Delhi.
Sh. Garib Das (Burli Kothi, Paprola) of Kangra district	**Plant Genome Recognition Award:** For conservation of **Local Kheera** and the award was received on 12.09.2023 (Rs. 1.0 Lakhs) by PPV&FRA, New Delhi.
AICRP on Seed (Crops)	**Best AICRP Centre (2023) for quality Seed Production**

☞Other Research Achievements

☞CROP PRODUCTION

Development and validation of on-station "Integrated Farming System" Model

On Station IFS model at Bhadhiarkhar farm (one ha)-



Identification of need based CROPPING SYSTEMS for different agro-climatic conditions

- **Okra-turnip-tomato** recorded **maize grain** equivalent yield (29.19 t ha^{-1}), but significantly higher compared to babycorn-broccoli-French bean (22.25 t ha^{-1}) cropping system.
- **Okra-turnip-tomato** also gave significantly **higher net returns** (Rs. 498 × 10^3 ha^{-1}) over the conventional **maize-wheat cropping system** (110 Rs. × 10^3 ha^{-1}).
- *Dhaincha*-early cabbage-French bean and sunhemp-vegetable pea-French bean sequences were the best for improved soil health.

Diversification and improvement of existing farming systems under small and marginal household conditions

- Farming systems identified (OFR Area):
  - ➢Field crops + Dairy (0.31 ha) with 18 farmers households
  - ➢Field crops + Dairy + Horticulture (0.4 ha) with 12 farmers household
  - ➢Field crops + Dairy + Goat/ Sheep + Horticulture (0.31 ha) with 6 farmers household.
- Low-cost interventions provided to the farmers households *viz.,* improved seed, recommended dose of fertilizers, fodder crop seeds and animal feed.
- The farming system involving **field crop + dairy farming** as the dominant one due to higher net returns.

Nutrient Management

- Long-term fertilizer experiments (since 1972) revealed that integrated use of fertilizers with FYM or lime significantly enhanced wheat productivity, sustainable yield index and soil health compared to sole use of chemical fertilizers.
- **Lime proved to be an effective alternative to FYM in acid soils, mitigating soil acidity and improving pH.**
- Balanced fertilization is crucial for maintaining **wheat** productivity, as omission of nutrients, especially S, caused significant yield reductions. Additionally, it also improved soil enzyme activities, with the **best results under 100% NPK + FYM, followed by 100% NPK + lime.**
- The target yield equations were developed for onion and garlic.

Control

N

NPK

No fertilizers better than imbalanced use

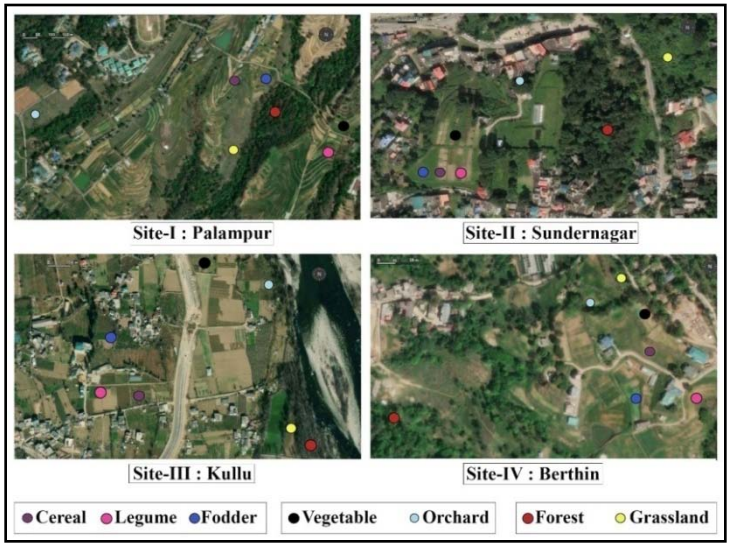
Liming comparable to FYM application in acid soils

NPK+FYM

NPK+Lime

Nutrient Management

- Natural systems recorded higher available boron and boron pools compared to cultivated systems
- Approximately 65% of the observed values fall below the critical limit of 0.45 mg kg^{-1}, indicating widespread boron deficiency in acid soils.



Nutrient Management

- The graded doses of nitrogenous fertilizer significantly impacted the wheat yield. The **maximum yield was obtained at 125% of RDN**. The **spray frequencies of nano-N liquid fertilizer, however, did not show any significant impact on wheat yield.**
- NPK levels significantly impacted the wheat yield and maximum yield was obtained under 125% of RDF which was at par with 100% of RDF. However, organic sources did not show any significant impact on yield.

Nutrient Management

Application of 60-80 kg **S** per ha resulted in significantly higher yields of gobhi sarson, gram and rajmash at Nangal, Palampur, Sundernagar and Kukumseri.

Standardization of suitable soil test methods and determination of critical & optimum levels for diagnosing micronutrient deficiencies in soils and crops

- Ammonium oxalate was found to be the most suitable extractant for **Mo** estimation in acid soils of Himachal Pradesh
- **Critical limit for Mo:**

  In soil - 0.147 mg kg^{-1} (cauliflower) & 0.143 mg kg^{-1} (French bean)

  In plant - 4.12 mg kg^{-1} (cauliflower) and 6.16 mg kg^{-1} (French bean)
- The conjoint application of B and Mo resulted in higher crop yield [**maize-cauliflower system in acid *Alfisols]*** and showed incline in all fractions of B and Mo after two years. Soil application better than foliar spray.

Geo-referenced quantification of soil nutrients in CSK HPKV, Palampur farms and preparation of thematic maps

- Thematic maps generated for the university farms formed the basis for SSNM in different farms
- Identified areas with acute deficiencies of S, B, Cu and Zn.

Water Management

- The assessment of water availability in three major *kuhl* command areas of Kangra district has revealed that although surplus water is available in main *kuhl* but in secondary/tertiary channels the availability is not assured.
- Construction of auxiliary tanks of 100 -200 m^3 along the *kuhls* and use of stored water during lean periods can boost the vegetable production in rabi season for enhancing the profitability and year around crop production.

Water Management

- Application of **5 irrigations** at 0.8ETc at 20-30 days interval in wheat and 6 irrigations of 0.9ETc at 7-10 days interval (June to mid-July and September) for **direct seeded rice**.
- Coupled with **integrated nutrient management practice** (75% NPK inorganic + 25% N through FYM+ seed treatment with *Azotobacter* + PSB) led to higher yield, returns, soil health, better carbon sequestration, **efficient water use** and sustainability of direct seeded rice-wheat cropping system.

Water Management

- Significantly higher marketable yield of **marigold,** net return, BC ratio and water productivity was obtained with the **0.6 PE sub-surface drip irrigation with 25% NPK basal and 75 % NPK through fertigation @ 7.5% NPK per splits in 10 splits at weekly intervals** as compared to 0.8 PE surface drip irrigation with 25 % NPK basal and 25 % NPK through fertigation @ 2.5% NPK per splits in 10 splits + vermiwash @ 750 l ha^{-1} fertigation at weekly intervals.

CROP PROTECTION

Eco friendly management of ZONATE LEAF SPOT in Sorghum

Among the **non-chemical methods** three foliar sprays of extract of eupatorium ark @ 10% was found best, which gave 41.87 % disease control with 41.59 % increase in the yield over check. However, Three foliar spray of propiconazole @ 0.1% (Chemical check) was found most effective which gave 51.22 % disease control with 68.26 % increase in the green fodder yield over check.

Eco friendly management of powdery mildew in white clover caused by *Erysiphe trifoliorum*

- Three foliar spray of **dashparni** @ 2% was found most effective with 40.0% disease control and minimum disease severity (36.0%), AUDPC value (435.85) and r (0.48) in white clover.
- Sprays of **Chitosan** @ 0.05%) exhibited 34.17 % disease control with disease severity (39.50%), AUDPC value (498.81) and r (0.46) in white clover.

Use of bio-agents in management of Pea Root Rot Complex

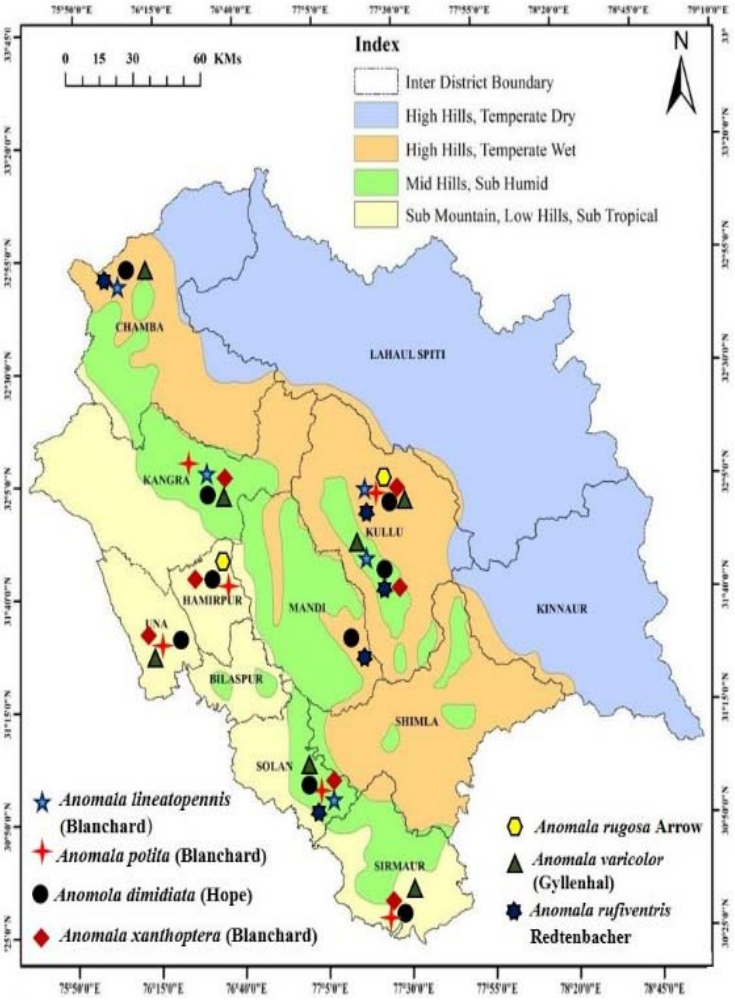
- Talc-based formulations of **eight endophytic fungi** (bio-agents) were evaluated and **all were found effective over control**.
- However, three formulations *viz*., ***Schizophyllum* spp. isolate JPE19**, ***Epicoccum* spp. isolate JPE2** **and** ***Talaromyces purpureogenus* isolate JPE38** displayed remarkable plant growth and disease control potential.

Insect Pest Management

Survey and surveillance:

- Soil Arthropods (white grubs, cutworms, termites and red ants)

  Distribution maps of white grubs and termites in Himachal Pradesh were prepared



Diversity of Termites:

16 species belonging to 12 genera & 5 families were recorded from various locations of Himachal Pradesh.

					
Archotermopsis wroughtoni (Desneux)	*Neotermes bosei* Snyder	*Heterotermes indicola* (Wasmann)	*Stylotermes faveolus* (Chatterjee and Thakur)	*Odontotermes obesus* (Rambur)	*Angulitermes nr. dehraensis* (Gardner)

Potato cyst nematode:

Recorded from higher hills (above 2000 msl) with 75-100% frequency of occurrence and not detected from low and mid hills so far.

Insect Pest Management

1. White grubs in potato:

- The economic losses upto Rs. 55,308 ha^{-1} are caused under un-managed situations
- Clothianidin 50 WDG was found most effective for the management with least tuber damage

2. Termites in wheat:

- Seed treatment with chlorantraniliprole 18.5 SC @ 2 ml kg^{-1} seed.

3. Pea leaf miner:

- Application of Spinosad 45 SC @ 0.3 ml/L followed by lambda cyhalothrin 5 EC @ 0.8 ml L^{-1}.

Weed management

- **Rice:** Pre-emergence application of pretilachlor + post-emergence application of bispyribac sodium + one hand weeding
- **Wheat:** Post-emergence application of clodinafop propargyl @ 60 g ha^{-1} and metsulfuron methyl @ 4 g ha^{-1}
- **Garden Pea:** Pre-emergence application of pendimethalin + imazethapyr 800 g ha^{-1} followed by post-emergence application of quizalofop-p-ethyl 50 g ha^{-1} or propaquizafop 50 g ha^{-1} or pre-emergence application of metribuzin 200 g ha^{-1} followed by one hand weeding at 45 days after sowing

Collection, identification and conservation of wild edible and medicinal mushrooms

Place	No. of specimen collected	No. of specimen deposited	Accession no. obtained
Palampur	21	7	2
Mandi	37	9	2
Bara	2	1	0

Mushrooms cultures along with Accession Number deposited with DMR

PLP-2: DMRX-2079
***Trametes* sp.**

PLP-28: DMRX-2128
Unknown

PLP-30: DMRX-2129
Unkown

PLP-16: DMRX-2127
***Russula* sp.**

Organic Agriculture & Natural Farming

Crop production under natural farming

1. Paddy

- The multi-locational yield of paddy ranged from 26 - 40 q/ha under natural farming.
- In addition, 3-4 q/ha yield of mash can also be harvested by growing the crop on bunds

2. Finger millet + Soybean

- Finger millet grain yield of 5-8 q/ha and intercrop soybean yield of 5-9 q/ha can be obtained with natural farming practices
- The total finger millet grain equivalent yield ranged from 14 - 22 q/ha

3. Wheat + Gram

- The wheat grain yield of 22 - 25 q/ha can be obtained under natural farming.
- Additionally, 7.5-9.50 q/ha gram yield as intercrop can also be harvested

4. Wheat + Pea

- The wheat grain yield of 15-22 q/ha and the grain equivalent yield of 35-48 q/ha can be obtained with natural farming practices
- 10-16 q/ha yield of peas can also be harvested through intercropping

5. Garlic + methi + palak + radish

- In this multiple cropping system, the yields of garlic, methi, palak and radish ranged from 12-21, 4-6, 7-15 and 9-17 q/ha, respectively when grown as intercrop with garlic
- The total garlic equivalent yield at different locations ranged from 34 - 45 q/ha under natural farming

Crop protection under natural farming

- The treatment of Artemisia + *Lantana* extract 1:1 (81.24- 81.44%) followed by treatment of *Lantana extract* (75.05- 77.77%) recorded the **highest efficacy** against blister beetle in black gram, *Riptortus* population in maize + soybean and *Helicoverpa armigera* in wheat + gram intercropping systems.
- The treatment of neem oil @ 3mL/L showed the highest efficacy to the tune of 74.42% and 80.13% against pea leaf miner maggot in wheat + pea intercropping system and against potato tuber moth in potato crop, respectively.

Soil & microbial studies: Multi locational studies

- The multi locational studies conducted on soil health at HQ, Kangra, Sundernagar, Kullu and Dhaulakuan centre showed that the dehydrogenase activity, available NPK, general bacterial count, actinomycetes count, P-solubilizing bacterial count and nitrogen fixing bacterial count were higher under the natural farming system for most of the crops. Whereas, the percent organic carbon was higher with organic farming treatment during *Kharif* season.
- During *Rabi* 2023-24 the percent organic carbon, microbial biomass carbon and available NPK were higher under organic farming system in all the crops. Whereas, the general bacterial count, actinomycetes count, P-solubilizing bacterial count and nitrogen fixing bacterial count were equal under natural as well as organic farming system

Performance of different crops under natural farming conditions

Paddy

Finger millet +soybean

Wheat + pea

Garlic+methi+paalak+radish+coriander

Veterinary

and

Animal Sciences

Animal Improvement and Distribution

Performance evaluation, chick production and distribution

- **Himsamridhi**, a location specific poultry variety, was propagated.
- The egg production at Poultry Farm was 2,56,950. Out of this, 96,608 eggs were sold as table eggs and 1,60,342 eggs were used for hatching of chicks.
- A total of 1,21,325 good quality chicks of different stocks were produced
- 1,15,699 chicks were supplied to 1248 backyard poultry farmers in 180 different regions.

Goat Improvement (AICRP)

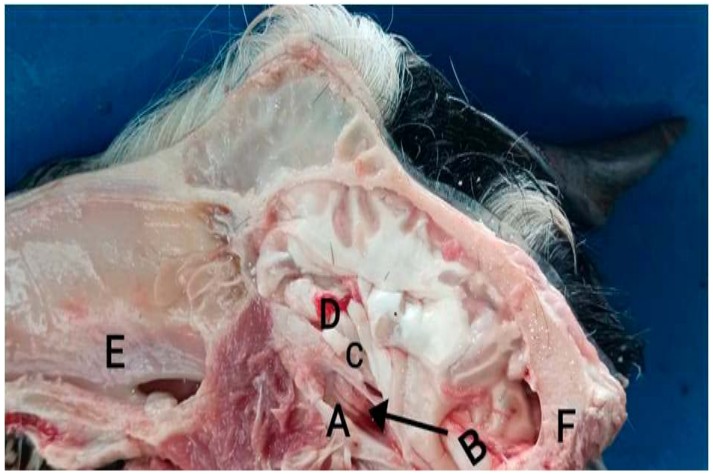
- A total number of **34 adult male Gaddi bucks** were **distributed** to selected farmers as breeding input.
- All selected animals were provided health coverage under migratory field conditions viz. vaccination against PPR and FMD (6962), de-worming against endo-parasites after faecal sample analysis (4208 animals), periodic health check-ups etc.
- **652 young kids** were added in selected flocks by way of birth.

GADDI DOG

- Adult female Gaddi dog are monoestrus i.e. they display estrus only once in a year. The duration of male acceptance ranges from 5 to 9 days.
- The average birth weight of Gaddi male pups is 520± 55 g while that of female pup is 490±35g. Further the birth weight is also linked to number of pups per litter.
- Litter size varies from 02 to 09 per whelping

Brain Anatomy in Different Seasons (Gaddi goats)

Gross morphological and biometrical characteristics of the pituitary gland in the Gaddi female suggested that the **pituitary gland** was most active during breeding season (autumn) from September to November.



Sagittal section of head showing brain and hypophysis cerebri (**A**) Sella tursica of sphenoid (**B**) Hypophysis cerebri (**C**) Mammillary body (**D**) Hypothalamus (**E**) Nasal septum (**F**) Occipital bone;

Disease Investigation

(Livestock, Poultry, Fish and Wild-Life)

Important disease conditions diagnosed

Necropsies

- A total of 1017 necropsies performed including 63 cattle, 02 buffalo, 04 horses, 32 sheep and goats, 18 dogs, 02 rabbit, 878 poultry and 18 wild animals and birds

Rabies, hydatidosis, pasteurellosis, verminous pneumonia, canine distemper, Parvo viral infection, salmonellosis, *E. coli* infection,

Clinical pathology

- 111 biopsies and 1035 clinical samples (158 urine and 877 cytology) were diagnosed by histopathological/ cytological examinations including inflammatory

Mast cell tumour, abscess, mycotic infections, squamous cell carcinoma, mammary gland tumour, lymphosarcoma etc.

Animal Disease outbreaks

- Four (04) outbreaks attended and investigated by the faculty on spontaneous mortalities at Mini Zoo, Rewalsar, District Mandi, Sperm Station, Palampur, Kalij pheasants in Nehru Pheasantry, Manali, Ram Centre Nagwain, District Mandi

Acute haemorrhagic enteropathy due to bacterial & parasitic origin in bulls, thrush (candidiasis) associated with immunosuppression in Kalij pheasants, endoparasitism in the exotic sheep (Merino)

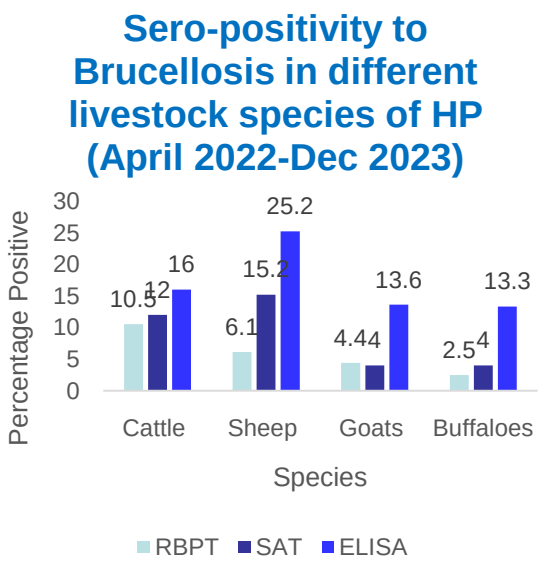
Footrot: A cause of severe economic loss to Gaddis

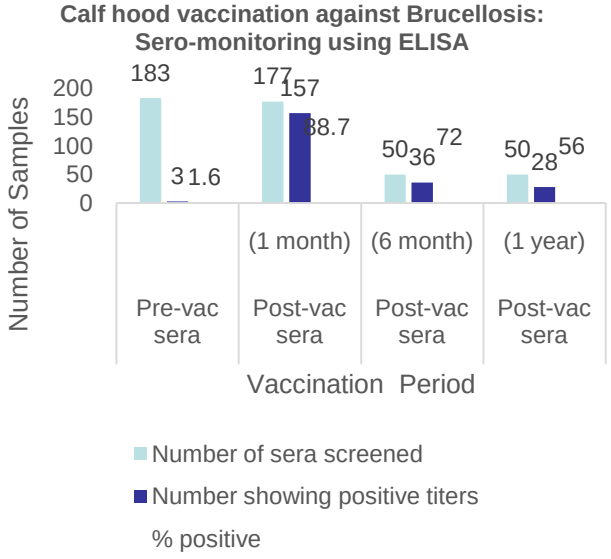
- A survey of 35 flocks, comprising 9250 sheep and 7690 goats, revealed foot lesions in 2837 sheep and 1716 goats, indicating the presence of foot rot.
- A total 25 (12.5%) from 200 such foot lesions samples were confirmed by PCR to be infected by *Dichelobactor nodosus (*E serogroup detected for the first time in H.P) the causative agent of Foot Rot.
- There is a need for having an indigenous footrot vaccine so that Gaddis and other shepherds could benefit by protecting their sheep and goats.

Sample collection from suspected case of Footrot from affected Goat	Sheep affected with Foot rot	D. nodosus, casue of Footrot, diagnosed through PCR

Brucellosis: A zoonotic disease

- In **674 serum samples screened** from different livestock, the overall prevalence of Brucellosis ranged from 2.5% to 10.5% using RBPT; 4-12 % by SAT and 13.3 to **25.2% by ELISA test**.
- The isolation, identification, and molecular confirmation of **18 *Brucella* species** from 273 animals exhibiting histories of abortions, infertility, or reproductive tract infections were also achieved.
- Paratuberculosis, Chlamydiosis, PPR, capripox, Lumpy skin disease, Haemoorhagic Septicaemia, CCPP etc. were confirmed through molecular means
- Many cases of Brucellosis, including those of neurobrucellosis were confirmed from human beings in collaboration with specialists from IGMC and Tanda Medical College.





Brucella abortus and *B. melitensis* isolates

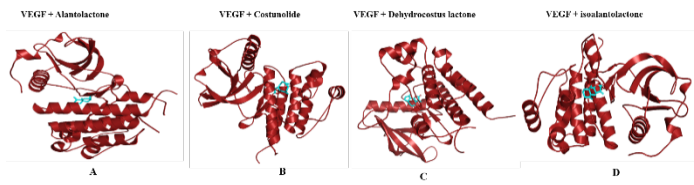
Pre-clinical trials

Studies on anti-neoplastic effect of *Inula racemosa* plant against chemically induced mammary tumor in laboratory rat model

- A dose-dependent anti-neoplastic effect of ***Inula racemosa*** was recorded where the root extract at the dose of 500 mg/Kg BW showed best **anti-carcinogenic** potential in rat model

Studies on ameliorating effect of *Inula racemosa* plant against DEN (Diethylnitrosamine) induced liver damage in laboratory rat model

- The root extract of *Inula racemosa* showed hepatoprotective action against DEN-induced liver damage in rats the root extract at the dose of 500 mg/Kg BW showed best **hepatoprotective potential** in rat model



NUTRITION

- Reducing methionine up till 0.05% with concomitant increase in betaine to the extent of 0.45% in commercial broiler feed positively influenced carcass characteristics and exhibited better live weight and improved feed efficiency.
- Supplementing Mn @ 50mg/Kg and turmeric powder (0.5% w/w) positively affect the internal egg quality parameters, improved eggshell calcium and Mn content influencing eggshell strength in layer Him-Smridhi (HS) birds.
- Feeding of ensiled lemon pomace with other feeds enhance the growth performance (81%) in beetal Goats.

Veterinary Public Health

- Validation of QuEChERS-HPLC-UV protocol for determination of Antibiotic Residues in Yak, Dzomo and hill cattle milk.
- Mathematical modeling for consumer's health risk assessments for antibiotics detected in milk was done.

PARASITOLOGY

- **Multi-acaricidal resistance** status of ticks in the northwest Himalayan region.
- Confirmation of blood protozoan parasites using PCR (119 samples)
- Around 1325 fecal and blood samples of various species of animals were screened for diagnosis of various parasites.
- A **protostrongylid lung worm, *Varestrongylus*** in the bronchi and bronchioles in slaughtered hill goat was the first record of its detection in the north western Himalayas.
- **LAB STUDIES on Lemon grass** (*Cymbopogon citratus*) indicated a **high larvicidal activity against ticks** (*Boophilus microplus*) of cattle.

PHARMACOLOGY

- Supplementation of *Vitex negundo* leaf powder in the broiler ration significantly increased ($p<0.05$) growth performance and hematological parameters in broilers.
- Significant increase in body weight was found in broilers supplemented with Turmeric, Garlic and Ginger extracts as compared to Control group.

CLINICAL DEPARTMENTS

Reproduction

Cattle infertility

- A unique association between endometritis and prolonged estrus in cows was observed in cows.
- A less observed, but seriously impacting cattle infertility condition called **urovagina** in repeat breeder cows was investigated. The urovagina severity was influenced by stage of estrous cycle, pelvic girdle angles and parity.
- Supra-basal serum progesterone concentration and higher velocity and volume of blood flow to uterus negatively affected the timely ovulation.
- Abortions in Lahaul valley cows:
  - ✓High prevalence of abortion **(20.58%)** had no direct relationship with progesterone or chromosomal abnormalities.
  - ✓Low vitamin A, magnesium and body condition score along with consumption of phytoestrogenic plants posed a significant threat of abortion.

Sexed semen in cows

Yielded conception rate comparable to that of conventional semen, with estrus duration being the key factor affecting conception under field conditions in crossbred cows.

Fig. 1

URINE ACCUMULATION ON THE FLOOR OF REPRODUCTIVE TRACT

Medicine

- **Diagnosis and management of thoraco-abdominal disorders in cattle and buffaloes**
- **Haemoprotozoan and Rickettsial induced renal disorders in dogs**
- **Electrolyte and Acid-Base Imbalances in Canine Gastroenteritis**
- **Analysis of Arrhythmia of the Heart in Dogs"**

  114 dogs (26.21%) exhibited various types or arrhythmias, such as atrial fibrillation (30.70%), ST- coving and sinus arrest (9.65%, each), and ST-segment elevation (8.77%, each).
- **Clinico-diagnostic studies and therapeutic management of congestive heart failure in geriatric dogs.**

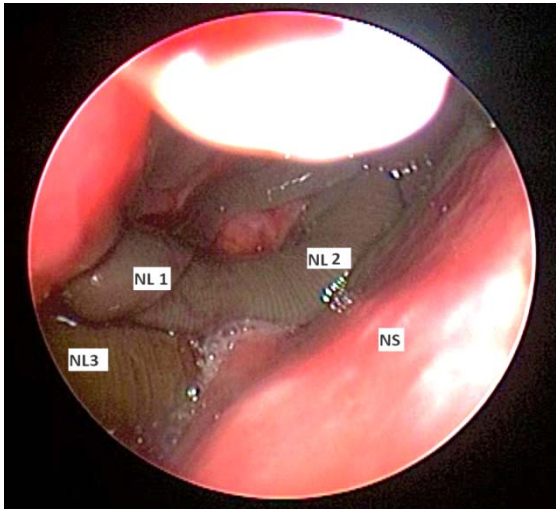
  With a prevalence of 0.93 percent; dilated cardiomyopathy (DCM) followed by mitral valve diseases (MVD) as the common etiology; treatment with carvedilol combined with pimobendan, ACE inhibitors, antihypertensives, and diuretics was most effective.
- **Diagnosis and management of neurological disorders in Canines**
- **Clinico-therapeutic studies on snake envenomation in dogs**

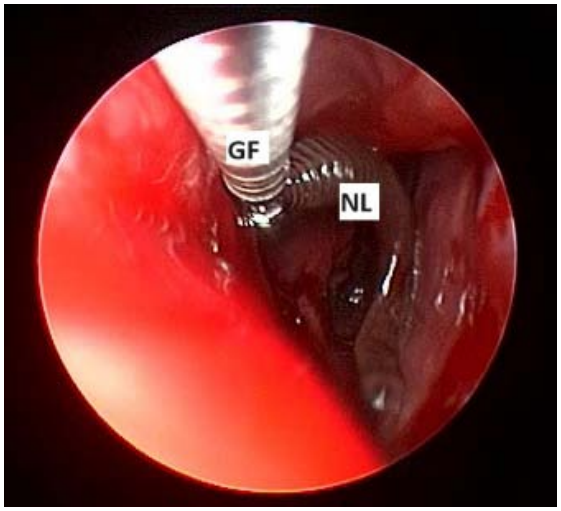
  A total of 20 dogs (0.75%) had snake bite; most prevalent in June; 16 dogs had venomous snake bite (Russel's Viper); dogs presented within first three hours of bite had better chances of survival.

Surgery

- **Tibial fractures in dogs**: Diaphyseal simple oblique fracture of tibia was most common. Minimally invasive plate osteosynthesis (MIPO) technique better than open reduction and internal fixation (ORIF).
- **Coxo-femoral (CF) joint conditions in dogs:** "Toggle Pinning Technique" was effective.
- **Hepatopathy diagnosis in dogs**: Sub-Xiphoid space in dorsal recumbency, right intercostal space in left lateral recumbency during ultrasonography were determined to be the ideal acoustic windows for establishing value of hepatic vein damping index in normal healthy dogs.
- **Eye surgery in dogs:** "Modified Morgan's conjunctival pocket technique" used for the repositioning of the prolapsed third eyelid gland in mild to moderate cases of "Cherry eye" condition in dogs
- **Dental extraction in dogs:** 90% of cases of advanced stages of periodontal disease responded positively to dental extraction
- **Anaesthetic management of cats:** Dexmedetomidine @22 µg/kg bwt., Ketamine @4.4 mg/kg bwt. in combination with Butorphanol @ 0.2 mg/kg bwt.or Buprenorphine @20 µg/kg bwt.or Buprenorphine@30 µg/kg bwt. provided safe general anaesthesia.

Endoscopic diagnosis and retrieval of NASAL LEECH in dogs

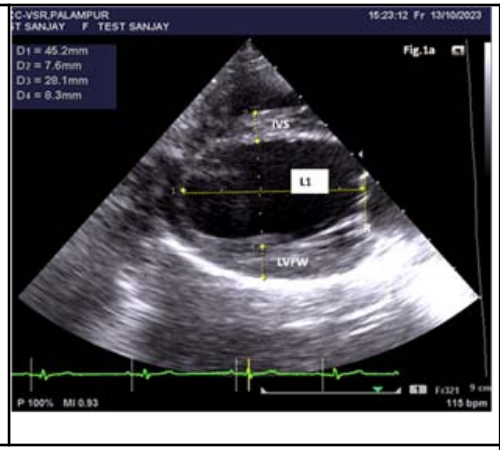




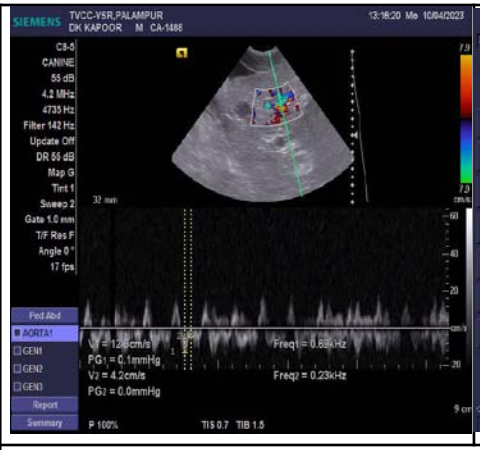
Management of hip-luxation in dogs by Toggle-pinning technique

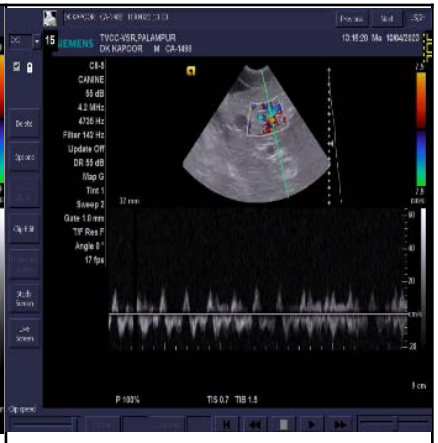
Before and after tooth extraction

Progress in echocardiography and hepatic sonography in dogs



Measurement of left ventricular internal dimension

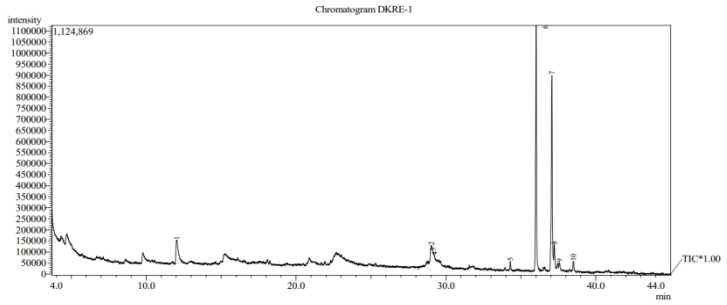


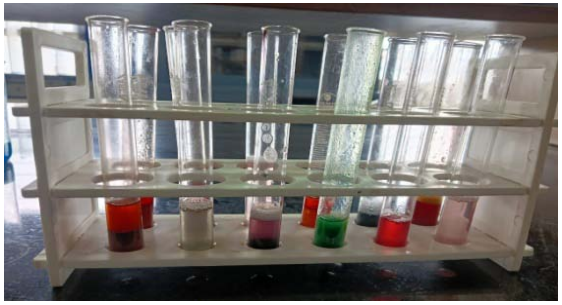


Spectral Doppler showing tri-phasic hepatic vein

Fisheries

- Feed with 5 gram of tea extract /kg of feed (Feed 1) and 10 gram tea extract / kg feed (Feed 2) and control feed was prepared; proximate analysis revealed no differences.; highest gain in weight was observed in group fed with Feed 1 followed by Feed 2 and than control show that it has positive effect on the growth of the fish.





COMMUNITY SCIENCE

1. The cookies incorporated with processed (roasted and germinated) foxtail millet @ 60% increased nutritional parameters and decreased anti-nutritional parameters as phytates and tannins, and were in acceptable range in sensory scores.

2. Roasted finger millet, pearl millet and little millet flours can be used @ of 20 per cent in different types of dry cakes.

3. Multi millet bread can be prepared by supplementing 25-30 per cent mixed millet flours (finger millet, little millet, foxtail millet, pearl millet and sorghum flour).

4. Starch extracted from HPU-51 var. of ADZUKI BEAN showed high amylose content making it an appropriate ingredient for diabetic people. It had good pasting properties making it a potential ingredient for a variety of food formulations. The soup premix was standardized by utilizing the starch extracted .

5. **Refinement in the Developed Technologies**: Plant fibre processing and product development, Eco-holi Gulal, eco-friendly bags were PASSED to interested farm women / artisans for adoption / skill upgradation.
6. The tools identified for vegetable cultivation and nutri-smart garden under *Poshan Abhiyan* were transferred in the field and were appreciated and adopted by the farm women.
7. Conducted ergonomic interventions of V weeder and improved weeder in maize field.

☞Collaboration (MoUs)-58

Agency/Organization	Number
State Agricultural Universities/Central University	4
ICAR Institutes	7
Govt. of India Organizations (Ministry of Textiles/DBT/DST)	7
PPV & FRA	3
Govt. of H.P.	3
Seed Companies	23
Other Miscellaneous Agencies	11

☞ITEM 4.

⇨To place before the Council the list of research projects since Janaury 31, 2023 to date.

☞Adhoc projects sanctioned from 31.01.2023 to date

College/Research Stations	Number	Budget Outlay (Rs. in lakhs)
College of Agriculture	21	352.292
College of Veterinary and Animal Sciences	19	233.50
College of Basic Sciences	01	46.50
Research Stations	02	10.52
Total	**43**	**642.812**

☞ITEM 5.

⇨ To place before the Council the abstracts of the Ph.D. theses submitted/approved from 31.01.2023 to date

☞Ph.D. theses approved

College/Department	Theses approved
College of Agriculture	62
College of Veterinary and Animal Sciences	02
College of Community Science	03
Total	67

THANK YOU