

Agriculture Officers Workshop

Rabi (2024-25)

RESEARCH HIGHLIGHTS

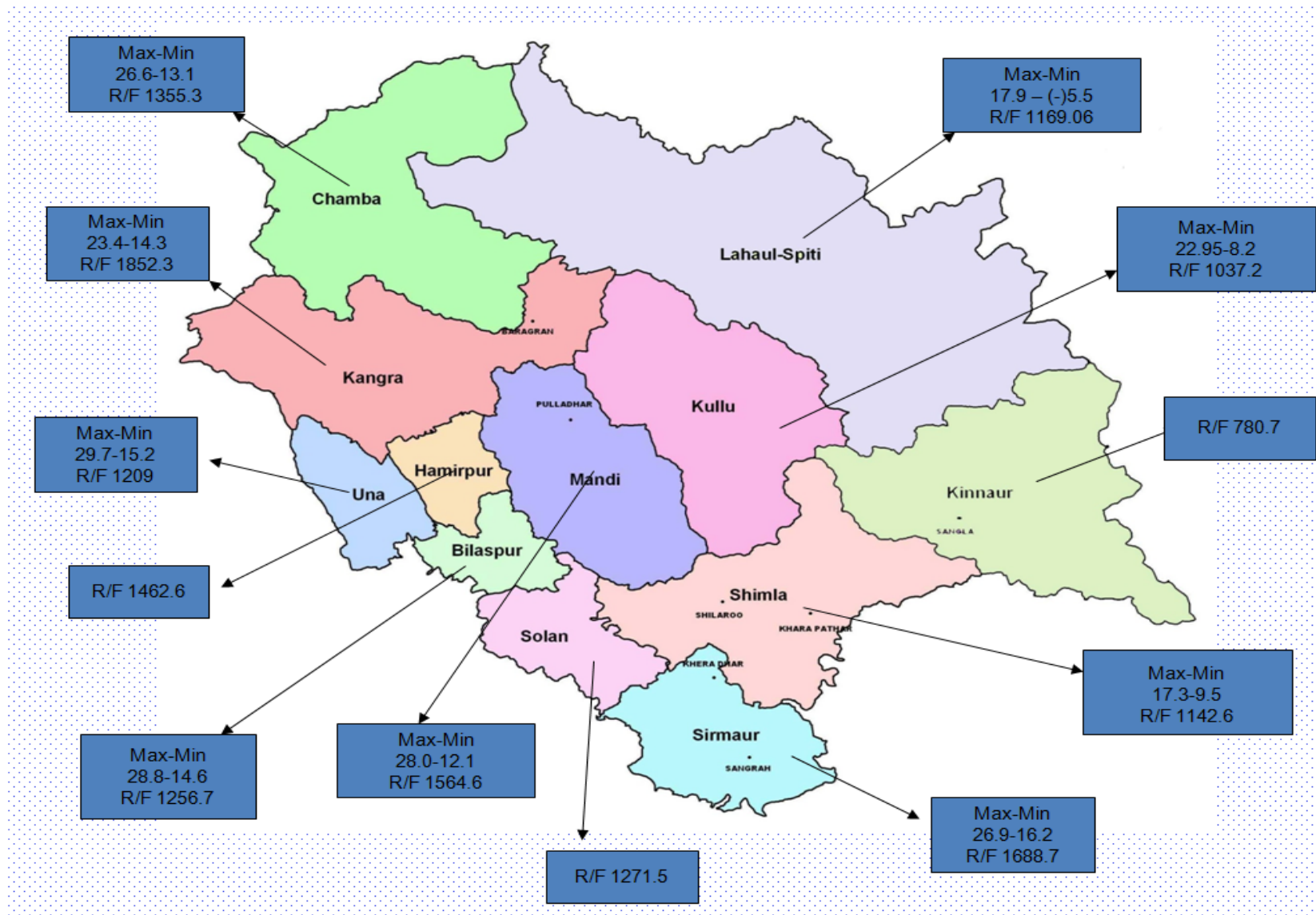


Director of Research

Chaudhary Sarwan Kumar

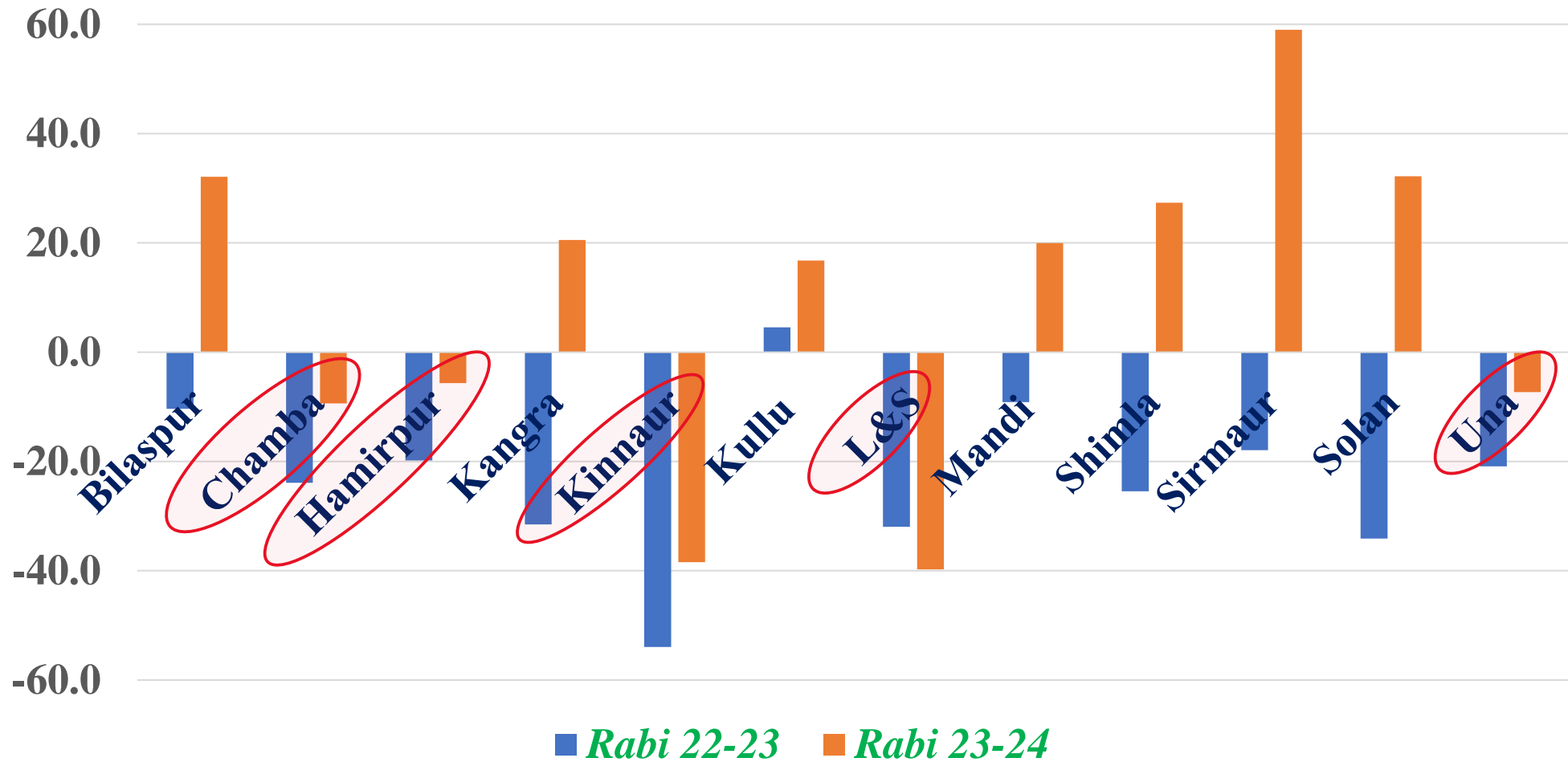
Himachal Pradesh Krishi Vishwavidyalaya

Palampur – 176 062 (H.P.)

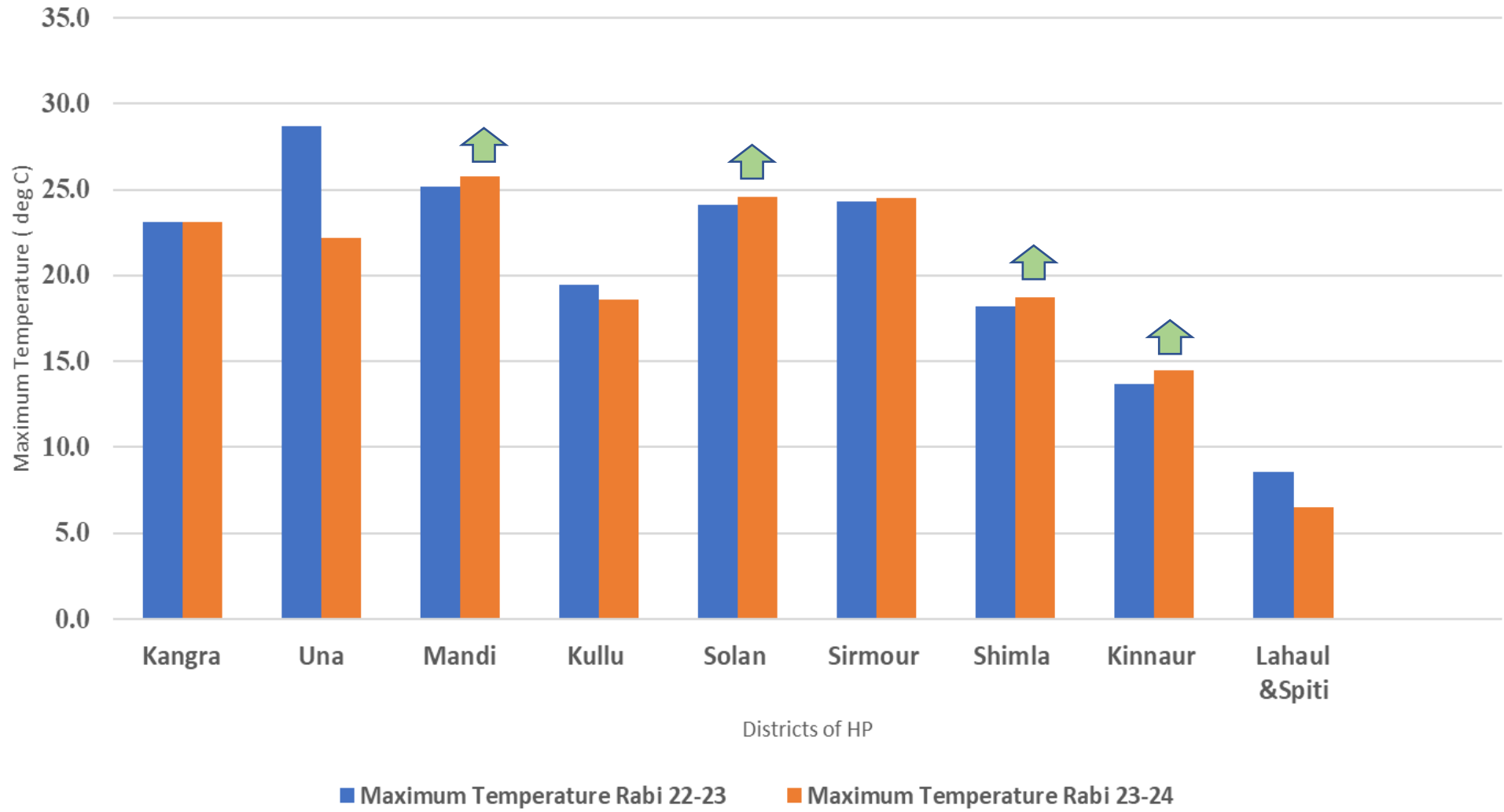


- Mean temperature rising @ 0.001 to 0.06°C year⁻¹.
- Higher temp. increase during *rabi* in low and mid-hills and during *kharif* in higher hill regions.
- Rainfall amount in the state are 26.5 to 1000.4 mm lower than in the 1980s.
- Rainfall decreasing by 1.9 to 28.0 mm per year.

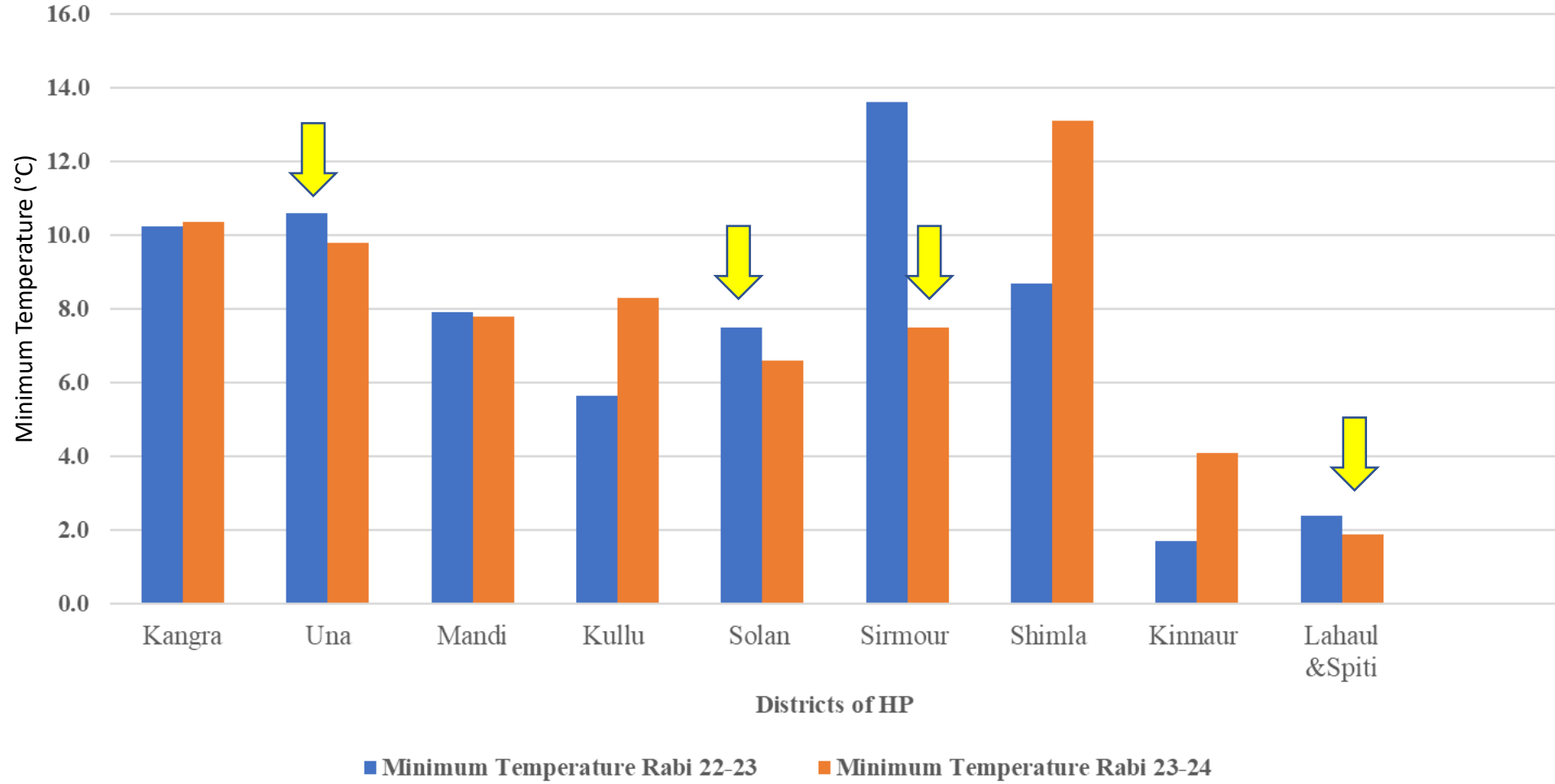
HP District-wise Rainfall (%) Departure from normal for *Rabi* seasons 2022-23 and 2023-24



HP Districtwise MaxT duirng Rabi 22-23 & 23-24



HP Districtwise MinT durning Rabi 22-23 & 23-24



Research Programme Areas

**Crop
Improvement**

**Crop
Production**

**Crop
Protection**

**Post Harvest
Technology**

**Livestock
Production
System**

**Hill Farm
Mechanization**

**Animal Disease
Diagnostic and
Health Services**

**Women
Empowerment**

RECENT FOCUS ON...

Integrated Farming Systems

Natural Farming & Organic Agriculture

Agro-techniques for Protected Cultivation

Soil Health

Rainfed Agriculture

Renewable Energy Sources

Effect of Climate Change in Agriculture

Drone Technology

RESEARCH HIGHLIGHTS





CROP IMPROVEMENT

New Crop Varieties

Cereals

Oat	Him Palam Forage Oat-1 (PLP-24)	Among 109 varieties of different crops released by Hon'ble Prime Minister of India on 11.08.2024.
Wheat	Trombay Him Palam Gehun 4	Recommended for release by the State Variety Release Committee.

Vegetable Crops

Pea	Him Palam Matar-3	Recommended by Research Evaluation Committee and approved in the AoW for Vegetable Crops held on 4th May, 2024.
Cauliflower	Him Palam Phoolgobhi Hybrid-1	
	Him Palam Phoolgobhi Hybrid-2	

Oats: PLP-24

- Multi-cut
- Green fodder yield: 306.7 q ha⁻¹
- Dry matter yield: 61.30 q ha⁻¹
- Crude protein: 10.90%



Wheat: Trombay Him Palam Gehun 4

- Suitable for timely sown, rainfed and irrigation conditions in low and mid hills
- Maturity: medium
- Average yield: 30-35 q ha⁻¹



Pea: Him Palam Matar-3 ('DPP-SP-6')

- Maturity: Medium
- Synchronized flowering
- High pod yield potential (140-180 q ha⁻¹)
- Disease resistance: Escapes powdery mildew infestation under field conditions.



‘Him Palam Phoolgobhi Hybrid-1’ (DPCafH-3)

- First hybrids from mid- late group of cauliflower from any public Institute using genetic mechanism (CSM)
- Curd initiation starts at 60-65 days after transplanting and marketable curds are ready for first harvest in 85-90 days
- High marketable curd yield potential (450-550 q ha⁻¹)



‘Him Palam Phoolgobhi Hybrid-2’ (DPCafH-5)

- Curd initiation starts at 54-60 days after transplanting and marketable curds are ready for first harvest in 80-85 days
- High marketable curd yield (400-500 q ha⁻¹)
- Planting these two hybrids simultaneously provide steady supply in the market by avoiding glut and help to fetch a premium price



Breeder and Foundation seed of different crops produced in *Rabi* 2023-24

Sr. No.	Crop	Breeder seed (q)	Foundation seed (q)
1.	Cereals	511.94	300.50
2.	Pulses	9.37	22.63
3.	Oilseeds	24.04	6.73
4.	Vegetables	8.79	1.05
5.	Fodder	44.83	1.20
Total		598.97	332.11

Besides this, 3,18,113 No. planting material of vegetables, fruits and fodder crops during Rabi 2023-24 were also produced.



Wheat Nucleus and Breeder Seed Production

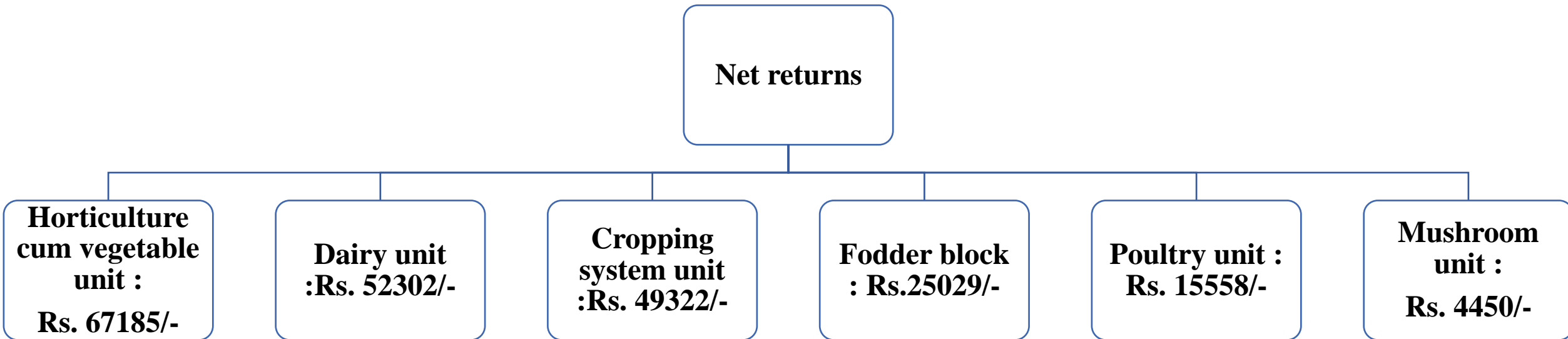




CROP PRODUCTION

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

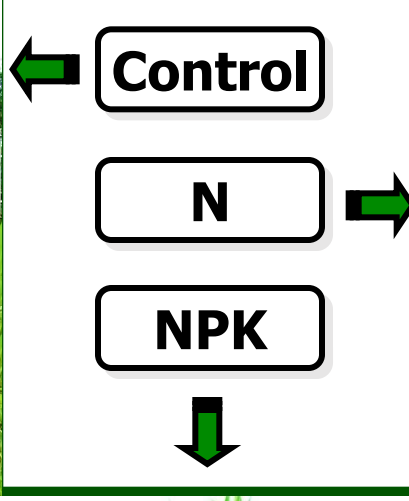
- **Okra-turnip-tomato** recorded significantly higher maize grain equivalent yield (29.19 t ha^{-1}) followed by **babycorn-broccoli-frenchbean** (22.25 t ha^{-1}) cropping system.
- The **okra-turnip-tomato** also gave significantly higher net returns ($\text{Rs. } 498 \times 10^3 \text{ ha}^{-1}$) over the conventional maize-wheat cropping system ($110 \text{ Rs. } \times 10^3 \text{ ha}^{-1}$).
- *Dhaincha*-early cabbage-frenchbean and sunhemp-vegetable pea-frenchbean 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

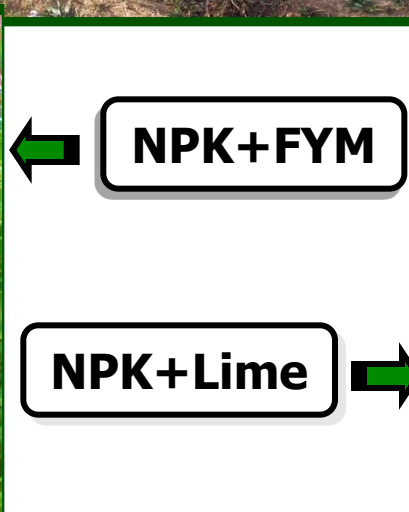
- Long-term fertilizer experiments (since 1972) revealed that integrated use of fertilizers with FYM or lime significantly enhanced wheat productivity, sustainable yield index and soil health compared to sole use of chemical fertilizers.
- Lime, like FYM, also proved effective in acid soils to mitigate acidity by 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.



No fertilization better than imbalanced use

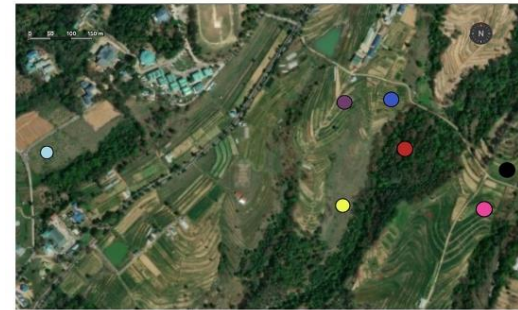


Liming comparable to FYM application in acid soils



Nutrient Management

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



Site-I : Palampur



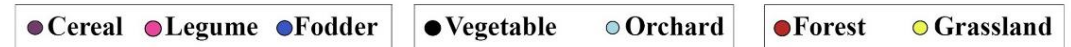
Site-II : Sundernagar



Site-III : Kullu



Site-IV : Berthin



Nutrient Management

- The graded doses of N and NPK fertilizers significantly impacted the wheat yield. The maximum yield was obtained at 125% of RDN and RDF.
- The spray frequencies of nano-N, however, did not show any significant impact on wheat yield.



Nutrient Management

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



Water Management

- To ensure year-round water availability to crops, three major *kuhl* command areas of Kangra district (Panchrukhi, Baijnath, Nagrota Bagwan and Kangra blocks) were assessed which emphasized the construction of auxiliary tanks (100 -200 m³) as water availability in secondary/tertiary channels is not assured in lean period even if surplus water is available in main *kuhl*.

Water Management

- Application of irrigations at $0.8ET_c$ for wheat and $0.9ET_c$ for direct seeded rice coupled with INM (75% NPK + 25% N through FYM + *Azotobacter* + PSB) significantly improved yield, net returns, soil health, carbon sequestration, water use and sustainability of direct seeded rice-wheat cropping system.





CROP PROTECTION

New Recommendation for POP (Vegetable)

Stemphylium blight of onion (*Stemphylium vasicarium*)

- Two sprays of Azoxystrobin 18.2 % + Difenconazole 11.4% w/w SC or Azoxystrobin 11% + Tebuconazole 18.3% w/w SC @ 10 g per 10 litres water at fortnight intervals



Purple blotch of onion (*Alternaria porri*)

- Two sprays with Difenoconazole 25% EC or Tebuconazole 25.9% EC or Azoxystrobin 18.2% + Difenconazole 11.4% w/w SC or Azoxystrobin 11% + Tebuconazole 18.3% w/w SC @ 10 gm per 10 litres water at fortnight intervals



Eco friendly management of powdery mildew (*Erysiphe trifoliorum*) of white clover

- Three foliar sprays of *dashparni* @ 2% or Chitosan @ 0.05% were most effective.



Management of Pea Root Rot Complex

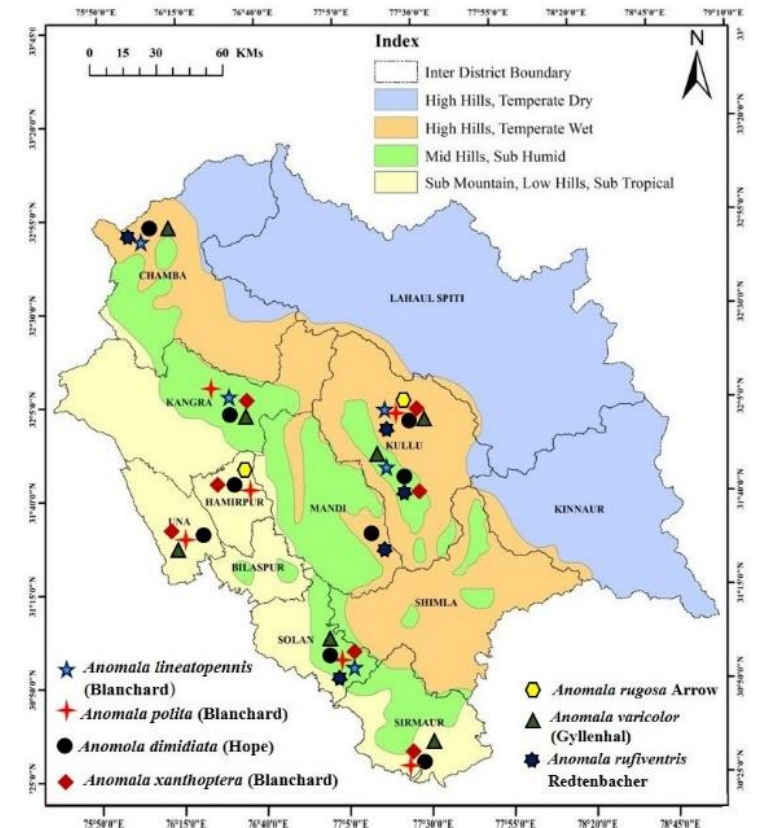
- Talc-based formulations of eight endophytic fungi were evaluated and **all were found effective over control.**
- However, three formulations *viz.*, *Schizophyllum* sp. isolate **JPE19**, *Epicoccum* sp. isolate **JPE2** and *Talaromyces purpureogenus* isolate **JPE38** displayed remarkable plant 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.

					
<i>Archotermopsis wroughtoni</i> (Desneux)	<i>Neotermes bosei</i> Snyder	<i>Heterotermes indicola</i> (Wasmann)	<i>Stylotermes faveolus</i> (Chatterjee and Thakur)	<i>Odontotermes obesus</i> (Rambur)	<i>Angulitermes nr. dehraensis</i> (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. Management of 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. Management of termites in wheat:

- Seed treatment with chlorantraniliprole 18.5 SC @ 2 ml kg⁻¹ seed.

3. Management of 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

👉 ORGANIC AGRICULTURE & NATURAL FARMING



Seed Production under Natural Farming Condition

Wheat:

- **HPW 368: 150 kg (400 m²)**
- **HPW 373: 165 kg (400 m²)**

Lentil:

- **Vipasha: 55 kg (1000 m²)**
- **Markandey: 34 kg (700 m²)**

Barley:

- **HBL-276: 34 kg (300 m²)**

Seed production demonstrations of identified varieties of wheat, lentil and barley were raised at farmers' fields and produced 596 kg seed of wheat (1600 m²), 135 kg (2200 m²) of lentil under natural farming conditions.



Crop production under Natural Farming Condition

- Multi locational trials at farmers' fields in Dhaulakuan, Mandi, Kullu, Kangra, KVK Sundernagar and Palampur were conducted.
- The natural farming system produced higher gram (5.6-8.2 q ha⁻¹), wheat (27.1-38.8 q ha⁻¹), oats (286.3-342.5 q ha⁻¹) and onion equivalent yield (66.9-113.0 q ha⁻¹) at different locations.
- Wheat equivalent yield at Kangra (38.48 q ha⁻¹), Kullu (38.38 q ha⁻¹) and Mandi (37.18 q ha⁻¹), oats equivalent yield at Kangra (335.76 q ha⁻¹) and Palampur (326.9 q ha⁻¹) and garlic equivalent yield Dhaulakuan (33.90 q ha⁻¹) were closely followed by the organic farming system.

Crop Protection

- In wheat + gram intercropping system, different botanicals/bioformulations tested against *Helicoverpa armigera*, *Artemesia* + *Lantana* extract 1:1 @ 10% showed the highest efficacy (70.42%) followed by *Melia* + *Lantana* + hot chili + garlic decoction @ 10% (66.86) at weekly intervals.
- In wheat + pea intercropping system, neem oil @ 3ml l⁻¹ showed highest efficacy (74.42%) against pea leaf miner and followed by *Agneyastra* @ 10% (58.24%) at weekly interval.

Soil & Microbial Studies

- The natural farming treatment (application of *Ghanjeevamrit* @ 5q ha⁻¹ + *Jeevamrit* at 14 days interval + mulching + *whapsa*) improved various chemical and microbiological properties of the soil followed by organic farming in most of the crops.

Collaboration (MoUs)-56

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	21
Other Miscellaneous Agencies	11

Adhoc Research Projects

Particulars	No. of Projects	Budget Outlay (Rs. lakhs)
Adhoc Projects Submitted (2023-24)	126	10237.77
Adhoc Projects Sanctioned (2023-24)	40	581.97
<i>Research Projects in Operation</i>		
All India Coordinated Projects	35	2100.00
Adhoc Projects	87	3631.36

On going Research Projects

Particulars	No. of Projects	Budget Outlay (Rs. lakhs)
AICRPs	35	2100.00
ICAR Adhoc funded Projects	10	163.95
DBT Funded Project	7	363.80
DST Funded Projects	6	248.00
HPCDP-JICA ODA, Hamirpur	2	555.11
Govt. of H.P.	10	1109.53
Govt. of India	2	360.86
RKVY Projects including Him Palam R-ABI	7	371.42
CSIR, PPV & FRA and Biodiversity International	6	137.48
BARC	3	66.76
Miscellaneous Adhoc Projects	34	254.45
Total	112	5731.36

Research Evaluation Committee Recommendations

Research area	Variety/ Recommendations
Crop Improvement	Inclusion of oat variety PLP-24 in package of practices
Natural Farming	Adhoc recommendations for package of practices for crop cultivation under natural farming <i>viz.</i> , paddy, finger millet + soybean, wheat + gram and, garlic + methi + palak + radish + coriander



Thank You..

