Tomato Pin Worm

Him Palam Gehun 3 (HPW 373)

Director of Research
CSK HP Krishi Vishvavidyalaya
Palampur – 176062 (H.P.)
## Monthly rainfall during Rabi 2017-18 as compared to Rabi 2016-17 in Himachal Pradesh

<table>
<thead>
<tr>
<th>Month</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Seasonal total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual (mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2017-18</td>
<td>0.3</td>
<td>6.9</td>
<td>48.0</td>
<td>9.2</td>
<td>45.9</td>
<td>37.5</td>
<td>58.5</td>
<td>47.3</td>
<td>253.6</td>
</tr>
<tr>
<td>2016-17</td>
<td>5.3</td>
<td>0.0</td>
<td>2.2</td>
<td>157.6</td>
<td>46.3</td>
<td>57.3</td>
<td>87.8</td>
<td>62.0</td>
<td>418.5</td>
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<tr>
<td>Normal (mm)</td>
<td>40.6</td>
<td>19.2</td>
<td>42.9</td>
<td>92.5</td>
<td>92.5</td>
<td>114.2</td>
<td>65.4</td>
<td>65.3</td>
<td>532.6</td>
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<tr>
<td>Departure (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016-17</td>
<td>-87</td>
<td>-100</td>
<td>-95</td>
<td>70</td>
<td>-50</td>
<td>-50</td>
<td>34</td>
<td>-5</td>
<td>-21</td>
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Research Focus

✓ Crop Improvement
✓ Crop Production
✓ Crop Protection
✓ Protected Cultivation
✓ Organic and Zero Budget Natural Farming
CROP IMPROVEMENT
New wheat variety HPW 373 (Him Palam Gehun 3)

(Identified for release by the SVRC)

✓ Av. yield 29.0 q/ha
✓ Resistant to yellow rust
✓ For **LOW** and **MID HILLS** under **LATE SOWN** CONDITIONS
PROMISING GENOTYPES OF DIFFERENT CROPS
HPW 441
- Yellow rust resistant genotype
- Timely sown
- Grain yield potential of 32.0 q/ha (rainfed) and 43.7 q/ha (irrigated)

HPW 442
- Yellow rust resistant genotype
- Timely sown
- Grain yield potential of 31.8 q/ha (rainfed) and 39.5 q/ha (irrigated)
Oil Seed Crops

Gobhi sarson : AKGS 8141

Mustard : AKMS 1002
VEGETABLE CROPS

DPP-SP-6
Profuse Pod Bearing
Long, Well Filled and Lush
Green Pods

DPP-SP-22
✓ Profuse Pod Bearing
✓ Long, Well Filled and
Bright Green Pods

DPP-SP-22
Profuse Pod Bearing
Long, Well Filled and
Bright Green Pods

DPP-SP-6
Profuse Pod Bearing
Long, Well Filled and Lush
Green Pods
VEGETABLE CROPS

Powdery Mildew Resistant Garden Pea Line 1-2 with Long Dark Green Well Filled Pods

Comparative Performance of Edible Pod Pea/Snap Pea lines at KVK, Berthin
Cabbage Hybrids in comparison to Check KGMR-1
**VEGETABLE CROPS**

- **Tomato Hybrids**
  - DPTH-1
  - DPTH-2

- **Bacterial Wilt Resistant Bell Pepper Lines**

- **Parthenocarpic Cucumber Line**
  - DPCCW-1

- **Wilt Resistant Chilli line**
  - VVGCh-1

- **β- carotene rich cherry tomato**
  - DCTY-1
Seed Production
## Quality Seed Production
(All major Cereals, Pulses, Oilseeds, Vegetables and Fodder Crops in *Rabi 2016-17*)

<table>
<thead>
<tr>
<th>Type of Seed</th>
<th>Quantity (q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nucleus</td>
<td>10.00</td>
</tr>
<tr>
<td>Breeder</td>
<td>668.49</td>
</tr>
<tr>
<td>Foundation</td>
<td>100.06</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>778.55</strong></td>
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</tbody>
</table>
Breeder and Foundation seed of different crops produced in Rabi 2016-17

<table>
<thead>
<tr>
<th>Crop</th>
<th>Breeder seed (q)</th>
<th>Foundation seed (q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>595.49</td>
<td>48.94</td>
</tr>
<tr>
<td>Pulses</td>
<td>16.44</td>
<td>25.20</td>
</tr>
<tr>
<td>Oilseeds</td>
<td>27.01</td>
<td>11.05</td>
</tr>
<tr>
<td>Vegetables</td>
<td>13.88</td>
<td>9.84</td>
</tr>
<tr>
<td>Fodder (Oats)</td>
<td>15.67</td>
<td>5.03</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>668.49</strong></td>
<td><strong>100.06</strong></td>
</tr>
</tbody>
</table>
WHEAT
Nucleus and Breeder Seed Production
Seed Production of **Gobhi sarson** variety GSC-7 at SAREC Kangra during the year 2017-18
Rice-palak-cucumber cropping system gave the highest rice grain equivalent yield (RGEY) of 14.4 t/ha and net returns of Rs. 2,21,193.

Okra-radish-onion with RGEY of 14.02 t/ha and Turmeric-pea-summer squash with RGEY of 13.5 t/ha were 2nd and 3rd best cropping systems, respectively.
Integrated Farming System Model (IFSM)

One hectare farming system model.

✓ Gross returns : Rs. 2, 34,557/-
✓ Net returns : Rs. 1, 16,652/-
## Contribution of different components (Net Returns)

<table>
<thead>
<tr>
<th>Component</th>
<th>Contribution</th>
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</thead>
<tbody>
<tr>
<td>Cropping system</td>
<td>41.1%</td>
</tr>
<tr>
<td>Horticulture/vegetable</td>
<td>10.1%</td>
</tr>
<tr>
<td>Dairy farming</td>
<td>35.9%</td>
</tr>
<tr>
<td>Fodder</td>
<td>8.6%</td>
</tr>
<tr>
<td>Mushroom</td>
<td>4.3%</td>
</tr>
</tbody>
</table>
Production potential feasibility of annual rye grass with berseem

✓ Sole rye grass (*Makhan* grass) produced higher green fodder yield followed by rye grass + berseem sown in 75:25 ratio.

✓ Higher crude protein content in *Makhan* grass sown with berseem in 50:50 seed ratio

✓ Five forage cuts in rabi season can be obtained if crops are sown in second fortnight of October.
IPNS based nutrient doses recorded higher productivity of wheat over non-IPNS

Higher B:C ratio of 2.30 (Chemical fertilizers+FYM) & 2.20 (Chemical fertilizers) in potato was recorded following Soil Test Crop Response (STCR) approach compared to the farmers’ practice (1.44) and general recommended dose (1.71).
• Optimum dose of boron to enhance cauliflower yields for acid soil (Palampur) was worked out to be 2.72 kg ha\(^{-1}\)

Doses tested: 0.5 to 5 kg  
Yield enhancement up to 25%
WATER MANAGEMENT
• Under protected conditions, strawberry crop should be irrigated 60% of pan evaporation and fertigated with 75% of recommended NPK.

• The highest potato tuber yield, net return and B:C ratio can be obtained by applying drip irrigation @ 60% of cumulative pan evaporation and 75% recommended dose of NPK.
CROP PROTECTION
Insect pest Management
Abundance of wheat aphid and its natural enemies

Population buildup of wheat aphid complex (*Rhopalosiphum padi* and *Sitobion avenae*) revealed its peak population (30.4 aphids/shoot) during 3rd week of March.

Seven coccinellid beetles species were recorded amongst which *Coccinella septempunctata*, *Hippodamia variegata* and *Coccinella transversalis* were more abundant.

Population of coccinellids was higher in the plots treated with *darekastra* and *azadirachtin* compared to synthetic insecticides.
Insect-pest fauna of onion in HP

- Ten insect species associated with *rabi* onion were recorded.
- Onion thrips (*Thrips tabaci*) was the most abundant

Damage by *Thrips tabaci* to onion plants
White grub pests associated with different crops

✓ **ELEVEN white grub species** have been identified causing economic losses in potato, pea, cabbage, ginger, maize, rajmash, apple, apricot, walnut, peach and pear.

✓ Twelve different insecticides were tested against grubs of *B. coriacea* and *H. longipennis* in potato.

✓ Chlorpyriphos 20 EC, acephate 50 + imidacloprid 1.8 SP and clothanidin 50 WDG at recommended doses resulted in 100 per cent mortality among 2nd instar grubs of *B. coriacea.*
Incidence of Tomato pin worm  
(Tuta absoluta)

- Tomato pinworm (Tuta absoluta) distributed widely in low and mid hill regions of the state.
- Apart from tomato, it was found infesting brinjal, potato and beans under protected and open field situations.
- Under protected cultivation, the pest caused severe damage to tomato crop (80–90% fruit infestation) in some parts of Mandi and Kangra districts.
- Under open field situations, fruit infestation varied from 0.5-9.8 per cent.
Efficacy evaluation of insecticides against *Tuta absoluta*

• Under protected and open conditions, flubendamide 480 SC @ 0.012% and indoxacarb 14.5 SC (0.015%) resulted in **45-52 and 38-44 per cent reduction in fruit infestation**, respectively.

• Installing 5 pheromone traps per ha for monitoring along with foliar application of flubendamide 480 SC @ 0.012% at flowering or azadirachtin (@ 0.00045%) at 15 days interval not only reduced incidence of pin worm *in tomato* but also increased its productivity and profitability under protected and open conditions.
In parthenocarpic cucumber, three organic products namely, *darekastra*, *tamralassi* and *vermiwash* (@ 10%) applied as foliar spray 10 days after transplanting at 10 days interval were found to be at par to chemical acaricides (spiromesifen 0.02% and fenazaquin 0.01%) with respect to bio-efficacy and crop yield.

Based on two year evaluation, these products were found suitable for incorporation in mite management programme under protected environment.
The hybrid rice grown in Bheora area of Mandi showed very high incidence (62.5%) of neck blast.

Seed treatment with Sedaxane 2.5% w/v + Fludioxonil 2.5 % w/v (50FS) at 3.0 ml/ Kg of seed, resulted in 97.8% control of loose smut of wheat and 24.7% increase in the grain yield.

Fungicides tebuconazole, hexaconazole, propiconazole and nativo were effective in reducing severity of wheat powdery mildew.
Disease Management

Six rapeseed-mustard genotypes namely YSB-9, PDZ-2, PDZ-3, PDZ-5, PDZ-7, DRMR-1-5 were resistant to white rust disease.
Weed Management

**WHEAT**

About 13% increase in WHEAT GRAIN EQUIVALENT YIELD under Conservation Agriculture System following Zero Tillage along with Integrated Weed Management in both maize and wheat crops.

**PEAS**

Early POST EMERGENCE IMAZETHAPYR @ 80 g/ha, EARLY POST IMAZETHAPYR @ 70 g/ha, PRE-EMERGENCE PENDIMETHALIN+IMAZETHAPYR @ 900 and 800 g/ha and PRE-EMERGENCE IMAZETHAPYR @ 70 and 60 g/ha is effective weed management (???).

**LINSEED**

PENDIMETHALIN @ 1.0 kg/ha (PRE-EMERGENCE) fb. METASULFURON METHYL @ 4 g/ha (POST-EMERGENCE) or ISOPROTURON @ 1.0 kg/ha with METASULFURON METHYL @ 4 g/ha as POST-EMERGENCE : BEST OPTIONS
Organic Crop Production
Promising Genotypes for Organic Agriculture

FABABEAN
- **Tested 12 genotypes.** HB-19, NDE-10 & HB-32 were superior to the check HPB-1 (47.41 a/ha) giving 62.50, 54.91 & 54.63 q/ha of yield.

LENTIL
- **Tested 13 genotypes.** HPLO-1 (12.50 q/ha) and HPLO-2 (10.50 q/ha) were superior **under organic conditions** while **under zero budget** natural farming conditions HPLO (8.33 q/ha) and DKC 13-12 (7 q/ha) performed better.

BUCKWHEAT line Sangla B-444 developed through selection has been proposed as IVT entry this year.
- **In IVT/AVT buckwheat trials,** Sangla B-464 was the highest yielding among the IVT entries at **NATIONAL LEVEL.**
TEST CROPS : GARLIC & ONION

- EVALUATED four organic liquid manures *viz.* Himsol, Vermiwash, Matka khad & Compost tea at two intervals *i.e.* 15 & 30 days. Application of vermiwash at 15 days interval (6 sprays) produced significantly highest bulb yield of 88.4 q/ha in garlic and 181.9 q/ha in onion followed by vermiwash spray at 30 days interval (3 sprays) which resulted in 74.8 q/ha yield in garlic.
Nutrient Management through Organic Inputs

TEST CROPS: PEA and POTATO

• Bio-gold and Phosphate Rich Organic Manure (PROM): Both the products were as good as standard organic treatment in recording significantly higher growth, yield attributes and yield in both the crops compared to the farmer’s practice and inorganic treatment.
Performance of different crops under natural Farming conditions
ZERO BUDGET NATURAL FARMING

Components

- Jeevamrita
- Whapasa
- Beejamrita
- Acchadana
RESEARCH EFFORTS in ZERO BUDGET NATURAL FARMING (ZBNF) initiated in CSK HPKV, Palampur during April, 2016 with organization of 4 days National Workshop on 27-30 April, 2016 under the Chairmanship of His Excellency the Governor of HP and Chancellor, of the University.

Padamshri Subhas Palekar was the key speaker
RESEARCH EFFORTS

PULSES: Gram, Lentil and Soybean;
CEREALS: Wheat and Paddy and
UNDERUTILIZED CROPS: *Ogla/phaphra* (Fagopyrum sp.)

✓ grown as TEST CROPS
Gurukul (Kurukeshtra) has the standardised set up of ZERO BUDGET NATURAL FARMING

Hon’ble Vice Chancellor, Scientists and students of this University visited Gurukul (Kurukeshtra) 2-3 times to understand the ZBNF model
FARMERS being educated on ZBNF in almost all the training programmes

Documentation of package for ZBNF in HINDI

Likely to be made available to the farmers shortly.
➢ BSc (Agri.) final year students also demonstrate the preparation of various ZBNF inputs to farmers of the adopted villages.

➢ KVK Una and Kullu are actively engaged in generating and disseminating ZBNF techniques to the farmers.
Inauguration of ZBNF Centre

✓ His Excellency, The Governor of HP and Chancellor of the University, Acharya Devvrat ji inaugurated ZBNF Centre on 29.01.2018

✓ Sh. Jai Ram Thakur, Hon’ble Chief Minister of H.P.; Prof. AK Sarial Hon’ble Vice Chancellor, CSK HPKV, Palampur; and a team of Cabinet Ministers, local MLAs were the other dignitaries present on the occasion

✓ The Govt. of Himachal Pradesh recently provided financial support of Rs. 3 crore to the University to strengthen research efforts on ZBNF
## On Going Research Projects

<table>
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<th>Particulars</th>
<th>No. of Projects</th>
<th>Budget Outlay (in Rs. lakhs)</th>
</tr>
</thead>
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<tr>
<td>ICAR Funded Projects</td>
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<td><strong>145</strong></td>
<td><strong>4091.84</strong></td>
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Proposal for release of Indian mustard variety

Trombay Him Palam Mustard-172 (THPM-172)

✓ Timely sown
✓ Irrigated conditions
✓ Low & mid hill areas of H.P.
Future Research Priorities
Crop Improvement

✓ Continuation of breeding work for development of high yielding and disease resistant varieties of wheat, barley, oats, brassicas, chickpea and important vegetable crops.

✓ Development of horticulturally desirable hybrids of cauliflower, cabbage and broccoli by using different genetic mechanisms.

✓ Collection, evaluation, maintenance and conservation of germplasm of different vegetable crops.

✓ Identification of high yielding lines of minor vegetables like lettuce, fennel, faba bean etc.

✓ Nucleus and breeder seed production of different released varieties.
Crop Production

- Development and validation of On-Station Integrated Farming System Model

- Identification of need based cropping systems for different agro-climatic conditions.

- Organic weed management in maize-pea sequence

- Optimizing nutrient requirements through innovative organic and inorganic fertilizer products in wheat

- To study the effects of Zn, B and Mo application on soil health and productivity in wheat, cauliflower and tomato

- To develop target yield based fertilizer prescription equations in garlic
Crop Protection

✓ Survey and surveillance of insect pests and emerging pests

✓ Management of termites in wheat, cutworms in cabbage, lepidopteran pests in cole crops, pests of tea through biopesticides, natural products and newer insecticides

✓ Evaluating impact of neonicotinoids on honey bees

✓ Monitoring of diseases of different rabi crops with special emphasis on yellow rust and Karnal bunt of wheat

✓ Management of important diseases of rabi crops (cereals, oilseeds, pulses and vegetable crops)

✓ Germplasm evaluation of different crops for resistance sources against different diseases
Protected Cultivation

✓ Production technology of important vegetable crops for protected environments

✓ Management of insect-pests and diseases

✓ Evaluation of natural products and bio-pesticides against greenhouse whitefly in cucumber
Organic and Zero Budget Natural Farming (ZBNF)

- Development & standardization of the cultivation technologies for different crops
- Evaluation of quality of dung and urine of Pahadi desi, Sahiwal, mixed breed and Jersy cows w.r.t. the microbial population and nutrient status
- Management of insect-pest & diseases under ZBNF system.
- Comparative economics of ZBNF, organic and inorganic farming
- Effect of different farming practices (including ZBNF) on the population dynamics of insect-pests infesting garden pea
Farm Mechanization

- Evaluation of Garlic Planter for cultivation of garlic.
- **DATA BASE** on strength parameters of agricultural workers in Himachal Pradesh.
- Construction and Evaluation of dry fermentation based 5 m³ biogas plant.
- Demonstration and ORP of solar gadgets and improved cook stove.