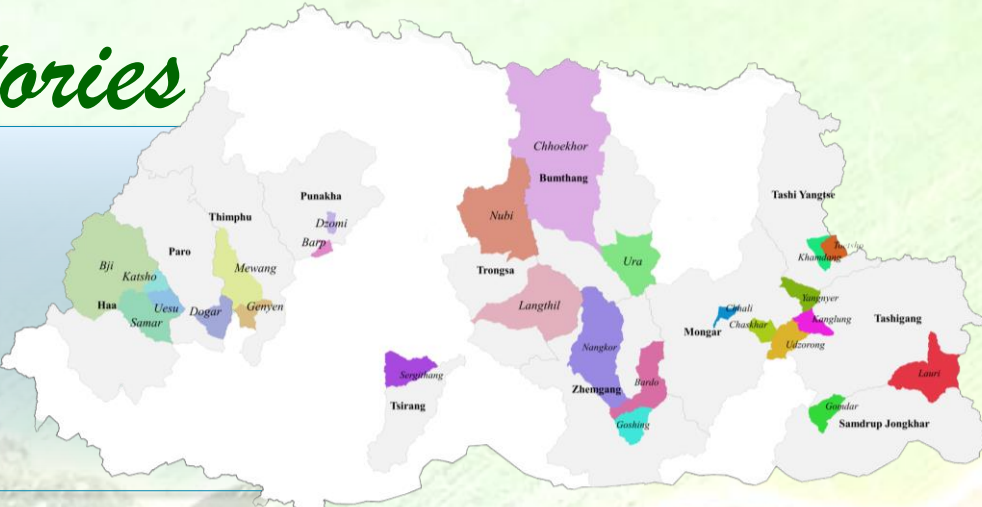


INSIDE *Stories*

STRENGTHENING CROP PROTECTION ACROSS BHUTAN

This month, the National Plant Protection Centre (NPPC) continued advancing plant health, pest preparedness, research, and institutional development through nationwide outreach, technical collaboration, and evidence-based interventions.



1 WHEAT HEALTH IN FOCUS (Page 2 - 4)



NPPC strengthened national wheat disease surveillance through extension training and farmer awareness programmes across multiple Dzongkhags to improve early detection, reporting, and disease management.

2 FALL ARMYWORM: PREPAREDNESS IN ACTION (Page 5 - 6)



Nationwide training and awareness campaigns equipped farmers with practical skills for early identification, monitoring, and safe management of Fall Armyworm in maize production systems.

3 LEARNING BEYOND BORDERS (Page 7)



NPPC participated in regional technical training in Thailand to strengthen Bhutan's capacity in monitoring pesticide susceptibility and improving sustainable pest management approaches.

4 RESEARCH FOR RESILIENT AGRICULTURE (Page 8 - 9)



Field trials are underway to evaluate fungicide performance against wheat stripe rust and assess new weed management options for maize production under Bhutanese conditions.

5 BUILDING PEOPLE, BUILDING INSTITUTIONS (Page 10)



NPPC welcomed new colleagues and shared international training experiences to strengthen technical expertise and institutional growth.

6 POLICY TO PRACTICE (Page 11)



NPPC joined national discussions at the MoAL Conference 2026 to support transformation of Bhutan's agrifood systems through stronger collaboration and evidence-based planning.

7 PEST ALERT (Page 12)



Stay vigilant for Fall Armyworm and armyworm-like activity. Early monitoring and timely action remain critical for protecting crops and strengthening national food security.

FREQUENT MONITORING

EARLY DETECTION

TIMELY ACTION



PROTECT OUR CROPS
STRENGTHEN FOOD SECURITY
SUPPORT OUR FARMERS



TURN THE PAGE → Discover the stories, people, research, and field actions shaping Bhutan's plant protection journey.



NPPC STRENGTHENS WHEAT DISEASE SURVEILLANCE THROUGH CAPACITY BUILDING AND FARMER AWARENESS PROGRAMS

The Pest Surveillance Program, National Plant Protection Centre (NPPC) conducted Wheat Disease Management Training and Farmer Awareness Programs to enhance wheat disease identification, surveillance, and management. The initiative brought together extension agents from six Dzongkhags, Regional Plant Protection Officers, and ARDC Bajo officials. Awareness campaigns were also conducted for wheat-growing farmers, focusing on disease recognition, prevention, and integrated management practices to strengthen national wheat health surveillance and productivity.



WHEAT DISEASE MANAGEMENT TRAINING PROGRAM

The training focused on key aspects of wheat disease management, including:

- Identification of major wheat diseases
- Application of integrated disease management strategies
- Standardized disease scoring methods
- Sample collection protocols
- Use of digital tools such as Open Data Kit (ODK) for field data collection
- Participants also received updates on emerging wheat disease threats and recent disease trends observed during previous cropping seasons.



FARMER AWARENESS PROGRAMS

Complementary farmer awareness programmes were implemented in major wheat-growing areas to enhance understanding of disease identification, management practices, and awareness of emerging and transboundary wheat diseases prevalent in neighboring countries.

Coverage Areas:

<i>Barp & Dzomi Gewogs</i>	<i>Punakha Dzongkhag</i>
<i>Nubi Gewog</i>	<i>Trongsa Dzongkhag</i>
<i>Chhoekhor & Ura Gewogs</i>	<i>Bumthang Dzongkhag</i>
<i>Mewang & Genyen Gewogs</i>	<i>Thimphu Dzongkhag</i>



KEY FOCUS AREAS

- Disease identification
- Integrated management practices
- Awareness of emerging and transboundary diseases
- Importance of early detection and cross-border vigilance
- Coordinated surveillance for safeguarding wheat production



LOOKING AHEAD

Building on these efforts, NPPC plans to conduct additional training programmes for extension agents in:

Paro Dzongkhag
Haa Dzongkhag
Trashigang Dzongkhag



UPCOMING AWARENESS CAMPAIGNS (APRIL – MAY 2026)

Haa Dzongkhag	Paro Dzongkhag
<i>Bji Gewog</i>	<i>Dokar Gewog</i>
<i>Kar-tshog Gewog</i>	
<i>Uesu Gewog</i>	
<i>Samar Gewog</i>	



EXPECTED OUTCOMES

- Enhanced disease monitoring and surveillance
- Strengthened advisory services for farmers
- Improved wheat productivity and resilience
- Contribution to national food security and agricultural sustainability

Extension agents from Thimphu, Punakha, Wangdue Phodrang, Chhukha, Samtse, Zhemgang, and Bumthang participated in wheat disease surveillance and management training to strengthen early detection, reporting, and response mechanisms.



22nd April 2026
Male - 4 & Female - 10; Total - 14

23rd March 2026
Male - 12 & Female - 7; Total - 19

2nd March 2026
Male - 12 & Female - 10; Total - 22

60
MALE
PARTICIPANTS

34
FEMALE
PARTICIPANTS

103
GEWOGS

10
DZONGKHAGS



25th March 2026
Male - 11 & Female - 4; Total - 15

10th March 2026
Male - 7 & Female - 2; Total - 9

28th May 2026
Male - 14 & Female - 1; Total - 15



Farmers from selected wheat-growing Gewogs received hands-on training on wheat disease identification, surveillance, reporting procedures, and integrated disease management practices to support national wheat health monitoring efforts.



30th March 2026
Male -17 & Female - 16; Total - 33

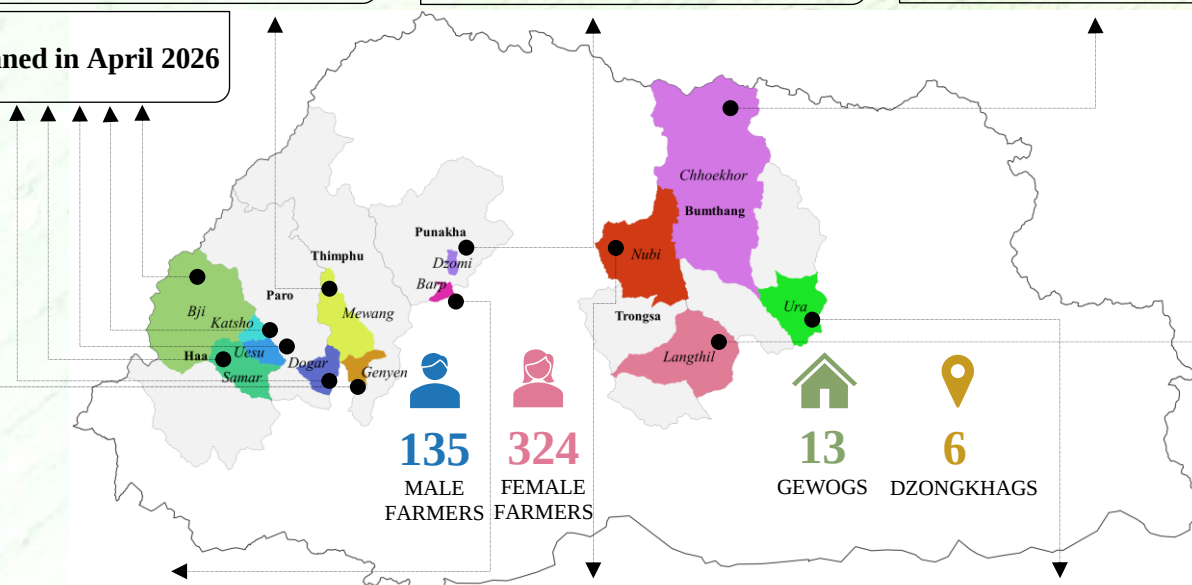


21st March 2026
Male -12 & Female - 33; Total - 45



18th March 2026
Male -11 & Female - 27; Total - 38

Planned in April 2026



4th March 2026
Male - 15 & Female - 14; Total - 29



12th March 2026
Male -18 & Female - 30; Total - 48



14th March 2026
Male - 8 & Female - 20; Total - 28



31st March 2026
Male - 17 &
Female - 18;
Total - 35



19th March 2026
Male - 9 &
Female - 11;
Total - 20



NPPC CONDUCTS NATIONWIDE FALL ARMYWORM TRAININGS AND AWARENESS CAMPAIGNS

The Entomology Program, National Plant Protection Centre (NPPC), in collaboration with regional Plant Protection officials and Agriculture Extension Agent continued extensive Fall Armyworm (FAW) awareness and farmers' training programs across eastern and central Bhutan during March 2026. The initiative aimed to strengthen farmers' capacity to detect, monitor, and effectively manage FAW infestations in maize fields through integrated pest management approaches.



Training Focus Areas

The trainings focused on improving farmers' knowledge and practical skills in managing Fall Armyworm infestations in maize. Key topics covered included:

- Identification of Fall Armyworm at different life stages (egg, larva, pupa, and adult)
- Recognition of typical damage symptoms in maize fields
- Field monitoring and scouting techniques for early detection
- Practical management strategies, with emphasis on the safe and effective use of pesticides.



Practical Field Demonstrations

To reinforce learning, practical field demonstrations were conducted on the proper use of two new-generation pesticides:

- *Emamectin Benzoate*
- *Chlorantraniliprole*

Farmers were guided on recommended application methods, dosage rates, and safety precautions to ensure effective and responsible pest control. Participants actively engaged in discussions and field activities, demonstrating strong interest in learning improved pest management practices.



Looking Ahead

The nationwide awareness campaign and training program have significantly enhanced farmers' preparedness to manage Fall Armyworm infestations and protect maize production. NPPC will continue expanding these outreach activities to additional gewogs to strengthen community-based pest surveillance and promote sustainable pest management practices across the country.

The farmers' training on fall armyworm identification and management in maize was successfully implemented under the AFACI PMP+ Project funded by the Rural Development Administration (RDA), Republic of Korea.



20th March 2026
Male - 47 & Female - 59; Total - 106

13th March 2026
Male - 17 & Female - 38; Total - 55

12th March 2026
Male - 31 & Female - 47; Total - 78



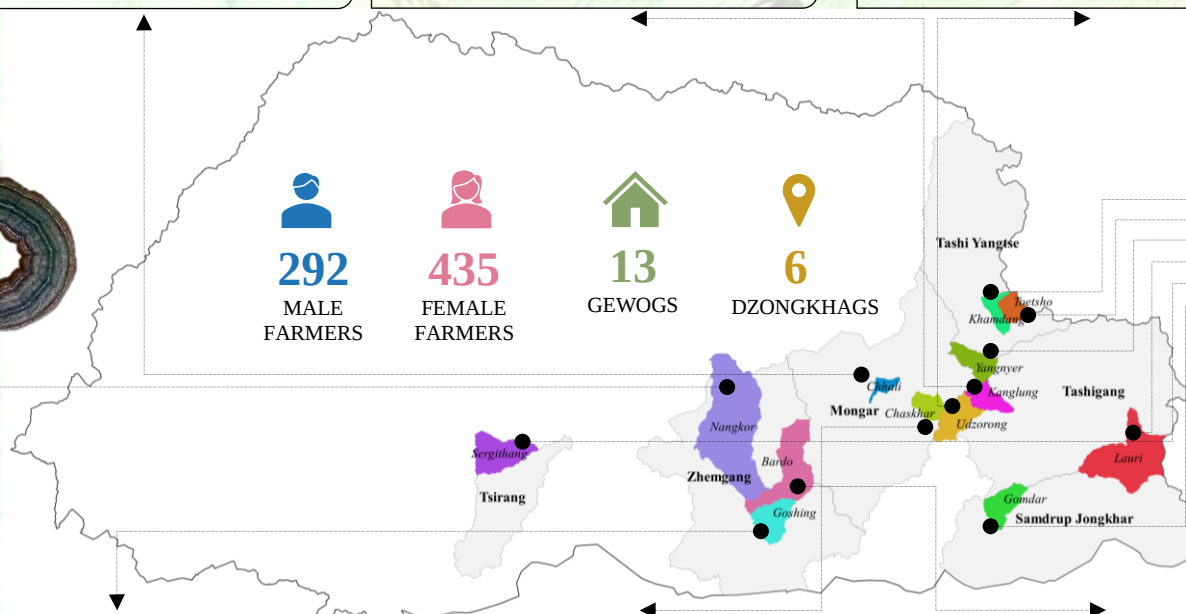
292
MALE
FARMERS

435
FEMALE
FARMERS

13
GEWOGS

6
DZONGKHAGS

CONDUCTED
IN
FEBRUARY
2026



24th – 25th March 2026
Male - 38 & Female - 34; Total - 72

16th March 2026
Male - 20 & Female - 30; Total - 50

21st March 2026
Male - 34 & Female - 58; Total - 92



18th March 2026
Male - 32 &
Female - 9;
Total - 23



BUILDING BHUTAN'S CAPACITY AGAINST FALL ARMY WORM

NPPC Officer Participates in Regional FAW Resistance Monitoring Training in Thailand



TRAINING FACTS



DATE

16-20 March 2026



VENUE

Bangkok, Thailand



ORGANIZED BY

Plant Protection Research and Development Office (PPRDO), Department of Agriculture, Thailand



WITH SUPPORT FROM

Food and Agriculture Organization (FAO)



PARTICIPANT

Mr. Tshelthrim Zangpo
National Plant Protection Centre

The National Plant Protection Centre (NPPC) continues to strengthen Bhutan's preparedness against emerging pest threats through international collaboration and capacity development.

Mr. Tshelthrim Zangpo represented NPPC at the Regional Training Course on Pesticide Susceptibility Monitoring of Fall Armyworm (FAW) held in Bangkok, Thailand from 16–20 March 2026. The training was organized by the Plant Protection Research and Development Office (PPRDO), Department of Agriculture, Thailand, with support from the Food and Agriculture Organization (FAO).



Fall Armyworm remains one of the most destructive pests affecting maize production worldwide. As resistance to commonly used insecticides continue to emerge, monitoring pesticide susceptibility has become increasingly important for sustainable pest management.



TRAINING HIGHLIGHTS

Participants visited advanced biological control facilities in Thailand and observed innovative pest management technologies, including:

- Production of FAW Nucleopolyhedroviral (NPV)
- Mass rearing of earwig predators
- Large-scale production of green lacewings
- Rearing of predatory bugs
- Research on entomopathogenic fungi for eco-friendly pest control

These technologies demonstrate how biological control can complement chemical management and reduce reliance on pesticides.



Key Takeaways

The training highlighted best practices for FAW insecticide resistance bioassays, emphasizing standardized methods, accurate data analysis, and resistance monitoring.



What Next for Bhutan?

Bhutan will strengthen its insecticide resistance monitoring program through technical support, bioassay implementation, and continued collaboration with FAO and DoA.



Impact for NPPC

The training enhanced NPPC's capacity, partnerships, and technical expertise for sustainable Fall Armyworm management in Bhutan.

RESEARCH AND FIELD TRIAL ACTIVITIES

NPPC continues to generate evidence-based solutions for crop productivity and food security. This month, key research trials are underway under the Pathology, Weed Science and Entomology Programs.

1 PATHOLOGY PROGRAM

Assessment of Fungicide Efficacy Against Wheat Stripe Rust

BACKGROUND

Wheat stripe rust caused by *Puccinia striiformis* f. sp. *tritici* thrives in cool, moist conditions and can cause 10–100% yield losses. Bhutan lacks validated management options; hence, this trial evaluates effective fungicides under local conditions.



METHODOLOGY

Locations: Barp (Punakha), Tang (Bumthang), Katsho (Haa)

Design: RCBD with 3 replications

Crop: Local wheat varieties (natural infection)

Spray Schedule: 2 sprays when disease reaches 5% severity; interval 7–15 days

TREATMENTS

1. Propiconazole 25% EC @ 0.1%

2. Hexaconazole 5% EC @ 0.1%

3. Control (Water spray)

KEY DATA COLLECTION

 Disease severity using modified Cobb scale (every 10 days)

 Grain yield (t/ha), 1000-kernel weight (g), test weight (g/1000 ml)

 Phytotoxicity observation (15 days post-spray)

 Efficacy calculation compared to control

TRIAL SCHEDULE (WEEKS AFTER SOWING)

0		Sowing of wheat
4-5		Scouting for stripe rust
5-6		First spray (at 5% severity threshold)
7-9		Second spray (7-15 days after first)
6-12		Disease rating at 10-day intervals
At Harvest		Record yield and quality parameters



2 WEED SCIENCE PROGRAM

Evaluating the Efficacy of a Synthetic Weedicide on Diverse Weed Population in Maize

BACKGROUND

Weeds cause up to 37% yield loss in maize globally. In Bhutan, weed control relies only on manual weeding, which is labor-intensive and costly. There is no selective herbicide currently available for maize.

OBJECTIVES

Evaluate Tembotrione 34.5% SC (Laudis) as a post-emergence weedicide in maize. Compare weed control efficiency of manual weeding with the new weedicide.

METHODOLOGY

Locations: NPPC greenhouse, ARDC Bajo, ARDC Wengkhar, and farmers' fields (Monggar)

Crop: Yangtsepa maize variety

Design: Randomized Block Design with 4 treatments, 3 replications

Application Window: From emergence to V8 stage (weeds < 6" height)

Weedicide: Tembotrione 34.5% SC (Laudis) – Post-emergence, systemic herbicide

TREATMENTS

1. Manual weeding (twice during the season)

2. Tembotrione 34.5% SC – 59 ml/acre in 40 L water (lower dose)

3. Tembotrione 34.5% SC – 89 ml/acre in 40 L water (higher dose)

4. Untreated control

DATA COLLECTION

 Pre-spray: Weed species identification and counts (1 m² quadrat)

 Post-spray: Weed counts at 14, 28, 42 and 56 days after application

 Final Assessment: Dry weight of weeds for Weed Control Efficiency (WCE)

 Data analysis: Using ANOVA (Microsoft Excel)

Period	Activity
March–April 2025	Field preparation and sowing
1 Month After Sowing	Herbicide application
14, 28, 42 & 56 DAS	Data collection
July–August 2025	Final data collection and harvest

DAS = Days After Spraying (or Days After Sowing, depending on the protocol definition used in the trial).



3 ENTOMOLOGY PROGRAM

NPPC Develops Two Rice-Based Entomopathogenic Fungal Mother Cultures for Fall Armyworm Management under AFACI Project

The Biocontrol Program of the NPPC has successfully developed two rice-based mother cultures of entomopathogenic fungi (EPF) specifically targeting Fall Armyworm (FAW), *Spodoptera frugiperda*, under the AFACI Project (PMP+). These mother cultures are produced on sterilized dried rice substrate and serve as starter inoculum for further multiplication and large-scale production of fungal biocontrol agents.

The two EPF mother cultures developed for FAW management are:

- ***Metarhizium anisopliae*** – An entomopathogenic fungus that infects a wide range of insect pests, including FAW larvae, particularly through contact with spores. Infection leads to reduced feeding, slow mortality, and eventual death of the pest, helping suppress field populations.
- ***Beauveria bassiana*** – A widely used insect-pathogenic fungus effective against FAW and other soft-bodied insects. The fungus penetrates the insect cuticle, multiplies inside the host, and causes mortality while being safe to non-target organisms.



Fall Armyworm larva (L3) infected with *Beauveria* and *Metarhizium*



Colony morphology of *Metarhizium* and *Beauveria* cultured on PDA after 7 days of incubation



Solid-state multiplication of *Metarhizium* and *Beauveria* on sterilized cooked rice showing fungal colonization and sporulation



Harvested fungal biomass of *Metarhizium* and *Beauveria*

The development of these mother cultures represents an important advancement in strengthening capacity for sustainable Fall Armyworm management. This initiative promotes:



Eco-Friendly Pest Control



Reduced Chemical Dependence



FAW Integrated Pest Management (IPM)

WELCOMING NEW STAFF TO THE NPPC FAMILY



Ms. Chokey Lhamo

The National Plant Protection Centre (NPPC) family warmly welcomed two new members to the Centre: Ms. Chokey Lhamo, Laboratory Officer, and Mr. Bikash Tamang, Senior Plant Protection Supervisor.

Ms. Chokey Lhamo recently joined the Royal Civil Service and commenced her professional career at NPPC. Mr. Bikash Tamang joined the Centre following his service as a Gewog Agriculture Supervisor in Geney Gewog under Thimphu Dzongkhag.



Mr. Bikash Tamang

The NPPC team is delighted to have both colleagues on board and looks forward to their valuable contributions toward strengthening plant protection services in the country. The NPPC family extends its heartfelt Tashi Delek and best wishes as they begin their journey with the Centre.



A Warm Welcome

As part of the welcome ceremony, the Program Director offered a Tashi Khadar as a gesture of warm reception and goodwill. This was followed by a series of presentations delivered by each Program at the Centre.

The presentations highlighted program vision, mandates, human resource strength, ongoing activities, and future plans.

SHARING KNOWLEDGE, BUILDING CAPACITY

In addition, two teams who recently attended international training programs shared their learning outcomes and experiences with the staff.

Learning from Odisha, India

The Odisha Training Team presented key knowledge gained from their training in Odisha, India. Their presentations covered the following topics:

1. Operation and Utilization of qPCR (Quantitative Polymerase Chain Reaction)
2. Operation and Utilization of ELISA (Enzyme-Linked Immunosorbent Assay)
3. Foundational Microbiology and Molecular Biology Techniques
4. Operation and Utilization of LAMP (Loop-Mediated Isothermal Amplification)



Learning from NRIIPM, New Delhi, India

Another team that attended training at the National Research Institute for Integrated Pest Management (NRIIPM), New Delhi shared their learning outcomes on:

1. Mass production techniques of insect predators
2. Entomopathogenic nematodes as a new tool for Integrated Pest Management (IPM)
3. Production of Nuclear Polyhedrosis Virus (NPV)
4. Mass production of *Corcyra cephalonica*, an important host insect used for rearing biological control agents.



The session facilitated knowledge sharing and capacity building, helping staff gain insights into new technologies, innovative pest management approaches, and practical techniques that can enhance NPPC's research and plant protection services.

Such initiatives continue to strengthen institutional capacity and promote a culture of continuous learning and professional development within the Centre.

NPPC Program Director Attends MoAL Conference 2026

 Bumthang |  25–27 March 2026

The Program Director of the National Plant Protection Centre (NPPC) attended the Ministry of Agriculture and Livestock (MoAL) Conference held from 25th –27th March 2026 at the Ugyen Wangchuck Institute of Forestry Research and Training (UWIFoRT), Lamaigoempa, Bumthang, under the theme “From Policy and Strategy to Implementation: Advancing Agrifood Systems Transformation.”



PARTICIPATION



The conference was graced by Hon’ble Lyonpo Younten Phuntsho, Minister for Agriculture and Livestock, and brought together more than 130 participants from the agriculture and livestock sector, including Economic Development and Marketing Officers from all 20 Dzongkhags, policymakers, senior government officials, and extension representatives.

PURPOSE & FOCUS



Over the three-day conference, participants deliberated on key policy directions, reviewed ongoing programmes, and identified strategic priorities to accelerate the transformation of Bhutan’s agrifood systems. The conference also provided a platform for sharing field experiences, strengthening collaboration, and promoting innovative and evidence-based approaches toward achieving the targets of the 13th Five-Year Plan (FYP).

KEY AREAS OF FOCUS



- Tracking and reviewing the progress of the 13th Five-Year Plan
- Implementation of the National Crop and Livestock Insurance Scheme and Cost Sharing Mechanism 2025
- Strengthening linkages from research to policy and action
- Enhancing agricultural marketing systems for improved market access
- Reviewing key project updates
- Leveraging integrated digital systems for data-driven decision-making
- Highlighting field success stories and lessons learned

KEYNOTE HIGHLIGHTS



His Excellency emphasized the importance of strengthened collaboration and called for closer alignment to enhance food security, promote sustainable rural livelihoods, and build a resilient agrifood system for the nation. He urged enhanced coordination among policymakers, departments and agencies, researchers, and local government officials, including field extension personnel, to address emerging challenges and deliver meaningful results.

His Excellency further encouraged participants to draw inspiration from His Majesty the King’s selfless service as the guiding North Star in advancing the 21st Century Economic Roadmap.

COLLABORATIVE EFFORT



The conference was organized in collaboration with FAO Bhutan and the United Nations Food Systems Coordination Hub.



FAO
Bhutan



United Nations Food
System Coordination Hub

FALL ARMYWORM ADVISORY

The National Plant Protection Centre (NPPC), would like to request all stakeholders to maintain heightened vigilance for any signs of Fall Armyworm and armyworm-like activity in agricultural fields.

With the onset of spring, periods of heavy rainfall followed by warm and dry weather conditions can create favorable conditions for the development and spread of this pest, increasing the risk of outbreaks. Therefore, all stakeholders are strongly encouraged to conduct frequent field monitoring to detect pest activity at the earliest stage.

Early detection is critical to enable timely management interventions and minimize crop damage during the initial stages of an outbreak.

Special attention should be given to fields where crops have reached susceptible growth stages, particularly the seedling and vegetative stages, especially in crops such as paddy and maize.

LOOK OUT FOR THESE SIGNS

- Small to large irregular holes on leaves
- Scraping of the leaf surface
- Holes on the whorl and young leaves
- Presence of larvae and frass (insect droppings)
- Damaged growing point/whorl in maize



FREQUENT MONITORING



EARLY DETECTION



TIMELY ACTION

NPPC extends sincere appreciation for your continued support and cooperation in safeguarding crop production and ensuring food security.

PROTECT OUR CROPS, SECURE OUR FOOD

Early Stages of FAW: Fall Army Worm Identification Tips



1



2



3



4



5



6



7





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Post Box: 670, Semtokha – Thimphu - Bhutan
Tel. (PABX): 02-351016/351655 Fax: 02-351656
Email: nppcsemtokha@gmail.com
Website: www.nppc.gov.bt

