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In partnership with:



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Case Study: Development and Implementation of a
Systems Approach for Pest Risk Management in
Pineapple (*Ananas comosus*) Exports from Bangladesh

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Introduction

- Pineapple is mainly grown in Tangail, Mymensingh, Chittagong, Bandarban, Khagrachari, Rangamati, Gazipur, Sylhet, and Moulvibazar districts.
- In 2021–22 production was 206164.51 MT in **13590.1 ha land** and in 2022-23 production was 196735.74MT from in **13137.5 ha** of cultivated land (BBS 2023).
- Varieties: **Giant Kew, Honey Queen, and Ghorasal and Super Sweet MD-2 variety**
- Pineapple exports from Bangladesh have gradually expanded, with **74.256 MT exported in 2022–23** and **71.188 MT in 2023–24** (Plant Quarantine Wing, DAE).
- Major destinations: Bahrain, **Belgium, Canada, England, France, Hong Kong, Italy, Kuwait, Lebanon, Maldives, Oman, Qatar, Saudi Arabia, Singapore, Switzerland, UAE, and the UK.**
- Cultivated following recommended production technologies by Bangladesh Agricultural Research Institute with the supervision of local Agriculture Office.
- The **Plant Quarantine Wing (NPPO) under the DAE** is responsible for implementing plant quarantine measures to ensure safe international trade.
- Measures are practiced in the production sites and packing house to manage risk pests considering export.
- Need integrated systems approach per ISPM 14 for better managements of risk pests
- Study evaluates existing practices vs IPPC guidelines





Objectives

- To **analyse the current pest risk management** approaches from the pre-planting to transportation stages in
- To **compare existing pest management practices with the ISPM 14** standards
- To identify **measures and strategies** for developing integrated systems approaches



OBJECTIVES





Methodology



Study areas : Major production districts, central packing house, export point

Data : 50 farmers + 16 PQ officers

Analysis : Excel, graph and charts to identified patterns

Evaluation : Current and standard practices

Literature : Scientific publication IPPC, NPPO, GAP, PRA



Pineapple Production System

- **Optimal soil:** Sandy/ loamy, pH 4.5–6.5
- **Key varieties:** Giant Kew, Honey Queen, and Ghorasal and Super Sweet MD-2
- **Pre-planting:** Sucker treatment, Soil preparation, Soil treatment, Fertilizers Application
- **Pre-harvesting:** Weeding, Irrigation, Pest Management etc.
- **Harvesting & Post-harvesting:** Maturity Index, Cleaning, Grading, transport etc.
- **Pre-shipment:** Cleaning, Grading, Packaging, Inspection, Diagnosis

Key Pests Identified (21)

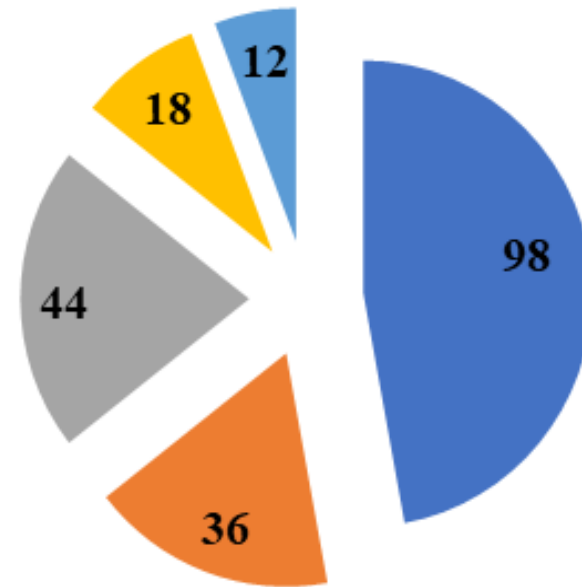
Pest group	Common name
Insects (07)	Mealybug (<i>Dysmicoccus brevipes</i> (Cockerell)), Onion thrips (<i>Thrips tabaci</i> Lindeman), Fruit borer (<i>Strymon basilides</i>), Termites (<i>Odontotermes obesus</i> (Rambur)), Scale insects (<i>Diaspis bromeliae</i>), Black spot beetle (<i>Metamasius dimidiatipennis</i> Jekel), Midget (<i>Elaphria nucicolora</i> Guenee)
Diseases (09)	Phytophthora heart and root rot (<i>Phytophthora cinnamomi</i>), Butt rot (<i>Chalara paradoxa</i>), White leaf spot (<i>Chalara paradoxa</i>), Black rot/ water blister (<i>Chalara paradoxa</i>), Anthracnose (<i>Colletotrichum ananas</i>), Fusariosis (<i>Fusarium subglutinans</i>), Heart rot (<i>Phytophthora parasitica</i>), Pineapple eye rot (<i>Gibberella sacchari</i>), Deep eye/ black eye (<i>Penicillium funiculosum</i>)
Bacteria (01)	Erwinia heart rot (<i>Erwinia chrysanthemi</i>)
Virus (01)	Yellow spot (<i>Tomato spotted wilt virus</i>)
Nematodes (01)	Root-knot (<i>Meloidogyne javanica</i>)
Weeds (02)	Nut grass (<i>Cyperus rotundus</i>), Bermuda grass (<i>Cyperus rotundus</i>)



Pre-Planting Practices

- ✓ **Pest-free sucker**
- ✓ **Sucker treatment:** Fungicide of Carbendazim, Mancozeb, Tebuconazole and Trifloxystrobin, Carbendazim + Mancozeb group in proper dose.
- ✓ **Soil treatment** with chemicals, such as bleaching powder or dolomite lime ($\text{CaCO}_3 + \text{MgCO}_3$) in proper dose.
- ✓ **Proper fertilization** following soil test report

% response



- Collection of pest free planting material
- Treatment of planting material
- Soil treatment for managing soil borne pests
- Soil test from designated authority
- Fertilizer application based on Soil test report

Pre-harvesting Practices

- ✓ **Planting suckers:** At proper time-generally October to December, 92% farmer practice following proper spacing (25-30cm) practiced by 94% farmers
- ✓ **Intercultural Operations:** Irrigation and Drainage (required based), Top dressing of fertilizer (Urea and TSP for 5 splits), Bagging.
- ✓ **Weed Management:** Mechanically (42%), weedicide (26%), Mulching (12%) and multiple technique (48%)
- ✓ **Pests Management:** IPM approaches, Chemical pesticides (86%), chemical & biological (12%) following proper dose at proper time (96%) , Eco-friendly approaches eg. Earthing up/bagging (42%) consulted with agriculture officer (92%) and document all activities (36%). Farmers knows about IPM (64%) and GAP (38%) for pineapple cultivation and pest management.

Measures are practiced by farmers that directly and indirectly manage risk pests in pre-harvesting stage

Measures in pre-harvest stage	% Response by farmers	
	Yes	No
Planting sucker at proper time	92	8
Maintaining proper spacing	94	6
Weeding with mechanical technique	42	58
Weeding by applying chemical weedicide	26	74
Weeding by mulching	12	88
Weeding by applying multiple technique	48	52
Application of Pheromone trap in the field	18	82
Application of pesticide at proper dose in proper time	96	4
Application of chemical pesticide to manage pest	86	14
Application of organic pesticide to manage pest	2	98
Application of chemical and biological pesticide both to manage pest	12	88
Application of Eco-friendly (Mulching, trapping and bagging) approach for pest management	42	58
Activities that influence to degree of measures for pest management		
Do u know about IPM?	64	36
IPM application for pest management	20	80
Do u know Good Agriculture Practice (GAP)?	38	62
Application of GAP for pineapple production	0	100
Documentation of pine apple production from pre-planting to post-harvest stage (for Traceability)	36	64
Pest management decision consulted with agriculture officer	92	8
Pest management decision by neighbor farmer	4	6
Pest management decision by own experience	16	84
Pest management decision by local dealer prescription	16	84



Harvest Practices

- ✓ Harvest by **maturity index (45%)**, typically determined by the coloration of the fruit's eyes.
- ✓ Harvesting is generally conducted **early in the morning** to minimize heat buildup and reduce post-harvest deterioration.
- ✓ The maturity stages of harvested fruits are usually categorized as 1/8, 1/4, 1/3, 1/2, 2/3, and fully colored surfaces.
- ✓ Some farmers **wear gloves** during harvesting to prevent mechanical damage and maintain fruit quality.
- ✓ Harvested pineapples are **placed in plastic crates or bamboo baskets**, and any damaged or infested leaves or fruit parts are removed.
- ✓ Fruits are then **cleaned and washed** (19% farmers), and **sorting and grading** (44% farmers) are carried out to separate infested, damaged, or abnormally sized fruits.

Measures are practiced by producers to manage pest harvest and post-harvest stage

Measures are practiced by producers	% response
Harvesting of pineapple following Maturity Index	45
Cleaning and washing of pineapple after harvesting	19
Application of any chemical for increasing shelf life of fruit	2
Application of any non-chemical strategy for increasing shelf life of fruit	5
Sorting & Grading of fruits	44





Measures are practiced in central packing house and plant quarantine station, HSIA related to pest risk management

Measures	Unit	%response
Pest Monitoring and Identification (ISPM 5, ISPM 31)		
Frequency of implementing pest monitoring and inspection programs	Regular	18.75
	Occasionally	62.5
Methods used for pest identification	Visual inspection	100
	Laboratory analysis	50
Maintenance and upgrading Pest identification records	Maintained	93.75
Pest Management Techniques (ISPM 14, ISPM 20, ISPM 38)		
Management approaches are used	Integrated Pest Management	100
Frequency of pest control treatments	As needed	93.75
Use of approved phytosanitary chemicals according to national standard	Used	100
Follow PRA for applying phytosanitary measures	Followed	100
Sanitation and Hygiene (ISPM 4, ISPM 26, ISPM 34)		
Following cleaning and sanitation schedules	Followed	93.75
Disposing waste and rejected fruits properly to prevent pest attraction	Disposed	93.75
Existence of designed packing areas to minimize pest entry and harboring	Exist	93.75

Inspection, Recordkeeping, and Traceability (ISPM 7, ISPM 12, ISPM 23, ISPM 41)

Conduction of internal inspections before shipment	Conduct	100
Presence of traceability system for each consignment	Present	81.25
Inspection results recorded and archived	Inspected	100
Reporting pest interceptions to NPPO or relevant authority	Reported	100
Export Certification and Compliance (ISPM 12, ISPM 14)		
Complying with export phytosanitary certification requirements?	Complying	100
Performing pre-export inspections by authorized officers	Performed	100
Are phytosanitary certificates issued and verified before shipment?	Issued and verified	100
Are non-compliance cases documented and corrective actions taken?	Documented	100
Training and Awareness (ISPM 2, ISPM 14, ISPM 20)		
Presence of trained staff in pest management and phytosanitary procedures	Presence	93.75
Are updated ISPM guidelines communicated to staff?	Communicated	93.75



Discussion

Comparison of Current Practices with ISPM 14 Requirements

- ❖ **Application of pest risk management measures:** Various measures are applied at both the production level and the central packing house prior to shipment.
- ❖ **Pest Risk Analysis (PRA):** Pest Risk Analysis for pineapple, published in May 2024, to facilitate trade cooperation with importing countries.
- ❖ **Surveillance activities:** Conduct survey occasionally with a team formed by NPPO.
- ❖ **Integration and independence of measures:** A few dependent and independent measures exist for managing pest risks.
- ❖ **Stakeholder coordination:** NPPO to bring together these stakeholders for collaborative planning and implementation.

Identified Gaps and Opportunities

- **Irregular surveillance practice. Conducting regular surveillance**
- **Pest Risk Analysis (PRA) up gradation & harmonization.**
- **Insufficient coordination among authorities. Establishing a dedicated Pest Management Unit** for standardization and integration of pest management practices.
- Exist **numbers of approaches**. Has opportunity to develop with modification and integration.
- There is **weakness for documentation** of risk pest management approaches. Opportunities to **integrate all the risk management approaches considering all stages** in a standard format.
- NPPO of Bangladesh **will be benefited by Decision Support for Systems Approach (DSSA) and The Production Chain or Pathway Chain tools**
- Presence of **trained manpower** to prepare and implement a systems approach.



Recommendations

- ✓ **Formation of a national coordination team:** A national team comprising scientists, academicians, exporters, producers, and other relevant stakeholders.
- ✓ **Application of decision support tools:** Analyse the *Decision Support for Systems Approach* (DSSA) and *Pathway Chain* tools in relation to current pest risk management practices and Implement tools.
- ✓ **Regular pest surveillance:** Conducting regular and scientifically based pest surveillance programs & upgradation the national pest list.
- ✓ **Review and harmonization of Pest Risk Analyses (PRAs):** Review and update the existing PRA for pineapple and compare it with the PRAs of importing countries.
- ✓ **Identification of specific dependent and independent measures:** Identify both dependent and independent pest risk management measures from **current practices** and integration.
- ✓ **Integration and documentation of the systems approach:** Integration of measures into a single, scientifically justified systems approach and documentation.
- ✓ **Monitoring, record-keeping, and continuous improvement:** Regular monitoring of implementation, record maintenance, and corrective actions. Continuous communication and coordination.



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Conclusion

- ✓ Pineapple is an emerging export-oriented agricultural commodity in Bangladesh, and export is increased.
- ✓ It is essential to apply advanced, science-based approaches for managing pest risks through a well-structured systems approach that aligns with national priorities and export strategies.
- ✓ Several measures exist to manage pest risks, these practices need to be systematically throughout the export supply chain.
- ✓ National Plant Protection Organization (NPPO), in collaboration with scientists, exporters, importers, and other stakeholders, will be able to develop a comprehensive systems approach following the guidelines of the International Plant Protection Convention (IPPC) and ISPM No. 14.
- ✓ Standard a system approach following ISPM 14 will enhance the export potential, ensure compliance with international phytosanitary requirements, and promote safe agricultural trade toward a more sustainable future.





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