# PLANT QUARANTINE, PEST RISK ANALYSIS AND PHYTOSANITARY SERVICES FOR ENVIRONMENTAL FOOD SAFETY & SECURITY IN BANGLADESH

Dr. Md. Ahsan Ullah

Consultant, Pest Risk Analysis (PRA)
Department of Agricultural Extension
Government of the People's Republic of Bangladesh

***Abstract:*** The purpose of this paper is to assess the Plant Quarantine, Pest Risk Analysis and Phytosanitary Services for Environmental Food Safety and security in Bangladesh and to suggest other useful methods that can be attempted to environment. Plant pathogens and invertebrates unsafe to plants, cooperatively referred to as plant pests; maintain to threaten food security and safety. International cooperation and regulatory systems to inhibit the spread of plant pests began formally in 1878. Primarily seven countries worked mutually and agreed phytosanitary measures. There are now 183 countries that are contracting parties to the International Plant Protection Convention, a treaty that aims to prevent the introduction and spread of pests of plants and plant products, and to promote suitable procedures for their control. Apparently contradictory interests between international trade, which has facilitated the spread of plant pests, and the protection of plants are mutually recognized in global trade and phytosanitary agreements. Globally ten Regional Plant Protection Organizations facilitate more local cooperation and recommend the regulation of over 1,000 named quarantine plant pests. Challenges that impede the success of limiting international pest movement embrace increased international trade and climate change. International guidelines designed to prevent pest spread current challenges of their own if they remain complicated to implement.

***Key words - Pest risk analysis, Phytosanitation, Plant biosecurity, Quarantine, Regulatory science***

## INTRODUCTION

Bangladesh though an agricultural country have to import a huge quantity of seeds and other plant and plant products. Annually on an average 130 lakhs tons of plants and plant products are imported for which Plant Quarantine Inspection are needed. Some times to ensure Phytosanitary measures Plant Quarantine treatment are adopted. Similarly, different commodities of plant and plant products are also exported to other countries of the world. Annually, on an average 10 lakh tons of Agricultural commodities, mainly Raw Jute and jute products, handicrafts, vegetable, fruits are inspected for the purpose of export for which Phytosanitary certificates are issued.

The modern means of transportation and handling of imports and exports favored the expeditious and extensive movements of plant and plant products their by increases the risk of plant pests introduction. Basically plant Quarantine is a preventive measure, it being the frontline of defense against the introduction of plants pests destructive to agricultural crops.

Bangladesh became a signatory to International Plant Protection Convention (IPPC) of FAO in 1974. It also became a member of the Asia and Pacific Plant Protection Commission in 1978 with express commitment to formulate rules and regulations to prevent the introduction in to and spread within the country of destructive pests and diseases through appropriate plant quarantine measures. Bangladesh is committed to strengthen Plant Quarantine Services and further regional cooperation among other member countries in the field of Plant Quarantine.

The existing Pant Quarantine legislation known as 'Plant Quarantine Act, 2011. The Destructive Insects and Pests Act, 1914 (Act, No. II of 1914) already repealed. After the repeal of the Destructive Insects and Pests Act, 1914, any action taken under such legislation and in force immediately before the repeal of such legislation shall continue to be in force so long as it is not inconsistent with the provisions of this Act.

The term "plant protection" refers broadly to any activity, including quarantine measures, which seeks to control plant pests and diseases in a country and at its borders. Principal elements in effective plant protection generally include the establishment of operational and accountable institutions internationally named as National Plant Protection Organization (NPPO), in Bangladesh NPPO named as Plant Quarantine Wing (PW) of Department of Agricultural Extension (DAE) and systematic application of scientific knowledge and technical practices, supported by administrative planning and law.

## OBJECTIVES OF THE STUDY

1. SWOT Analysis of the present practices in Bangladesh and export and import countries.
2. Identifying the major techno-legal aspects of Agricultural Extension involvements.
3. Identifying the plant pest symptoms in the context of Agro-commodities of Bangladesh.

## METHODS AND MATERIALS

### Research Design

The design of the study was descriptive as well as survey type.

**Study Area**

The study was conducted Dhaka Division of Bangladesh.

**Sampling method**

A purposive sampling technique was adopted for this study.

**Sample size**

The study sample size was 150 respondents, one fifty from each group.

**Source of Data**

Data were collected from primary and secondary sources. In this study both qualitative and quantitative information and data were required. In order to generate database of the study, all necessary information were collected from different primary and secondary sources.

**Source of Primary Data**

Primary data were collected from the respondents of the study.

**Source of Secondary Data**

Secondary data were collected from reference books on the matter, annual reports of the Ministry of Education, Newspapers, and periodicals, articles from national and international level. Internet sources were also used for research. An attempt was made to include the latest information whenever available.

**Methods of Data Collection**

A questionnaire was developed in order to make an extensive study. Necessary data were collected from the respondents through face to face interview with the respondents, observation and review of concerned documents.

**Tools of Data Collection**

Questionnaire was used for primary data collection.

**The major methodology followed in the research dominantly includes:**

- Technical interpretation based scientific survey.
- Categorizing applied and adaptive recommendations.
- Collection and analysis of field and plant problem symptoms.

**Variables**

**The major variable used in the research includes:**

**Professional:** i. Agri. Plant quarantine and Protection Extensionist, ii. Plant import Company Managers Distributors Dealers, iii. Plant Quarantine and protection Teacher and Trainers

**Commodity:** i. Plants ii. Plant Products iii. Soils/Media

**Techno Legal points**: i. Testing ii. Confinement iii. Disposal

**Study Population:** At least 50 for each Category, or 50% of the available respective and working respondent, at random from the selected groups.

The methodological parameters considered in preparing the research Questions and the questionnaire were as follows.

**Data Analysis**: Data will be computerized, analyzed and interpreted using Computer Program SPSS and Microsoft Excel.

The methodological parameters considered in preparing the research Questions and the questionnaire were as follows:

**Methodological Referral Parameters**

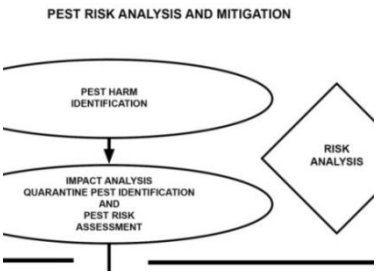


PRA def

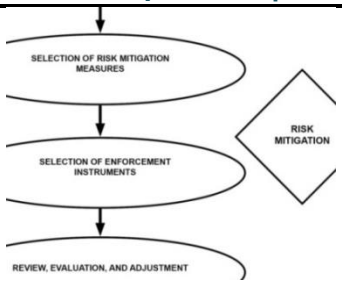
| Issue | Details |
|---|---|
| Food safety | MRLs<br>Heavy metals<br>Food additives<br>Hygiene requirements<br>Traceability<br>Hazard analysis and critical control points (HACCP) |
| Plant health | Surveillance<br>Plant quarantine<br>Pest risk assessment<br>Sanitation |

| | |
|---|---|
| Product quality | Grading<br>Freshness<br>Product composition<br>Product cleanliness<br>Labelling requirements<br>Control of nutritional claims |
| Environment | Control of water and environmental contamination<br>Recycling requirements<br>Organic production requirements<br>Protection of biodiversity<br>Protection of endangered species |
| Social | Labour standards<br>Fair trade standards<br>Corporate social responsibility |

Components




Risk analysis factors




Risk mitigation factors


Environmental Points

Import/export controls at 30 border inspection posts for plant pests/ diseases. Operates under Plant Quarantine Act 2011. Responsible for authorization of pesticides (Pesticide Ordinance 1971)


Environmental Pillars

b. Environmental sanitation

1. Inspection of food
2. Methods of disposal of excreta
3. Detecting and reporting diseases
4. Practice of isolation, quarantine, fumi disinfection
5. Detailed instructions on the correct w washing

Import -export

Environmental -phytosanitation

**Questionnaire**

**A. Respondent Database:**

1. Name----------
2. Designation with address----------
3. Qualification ---------- Place of work ---------- District/City----------
4. Gender with age----------
5. Other specialties----------

**B. Research Questions:**

(In light of the PQA 2011. And the Methodological referral parameters of Bangladesh)

1. **Strength points.** Give tick mark to any 2 as 1(first priority) and 2 as second priority) at the left side of the point.√
   a. Test facilities at the Port: Multidisciplinary Team
   b. Import Process: Stepwise import by multinationals
   c. Marketing system: Flexible to Agri-Extension/Environment and Forest Ministries
   d. Disposal of rejected material: Environmental and other acts.
2. **Weakness points.** Give tick mark to any 2 as 1(first priority) and 2 as second priority) at the left side of the point.√
   a. Test facilities at the Port: Undue Options
   b. Import Process: Undue options
   c. Marketing system: Inclusive dealer
   d. Disposal of rejected material: Weak specifications
3. **Opportunities points.** Give tick mark to any 2 as 1(first priority) and 2 as second priority) at the left side of the point.√
   a. Test facilities at the Port: NARS person available
   b. Import Process: Phytosanitary integration
   c. Marketing system: Training of dealer/ nursery
   d. Disposal of rejected material: Regular specifications
4. **Threat points.** Give tick mark to any 2 as 1(first priority) and 2 as second priority) at the left side of the point. √
   a. Test facilities at the Port: Limited faculties
   b. Import Process: No country need analysis
   c. Marketing system: No importing Company Training for clients
   d. Disposal of rejected material: No techno-legal monitoring

**Question 2: Identify the techno-legal aspects of PQ Agricultural Extension involvements:**

**Test Facilities:**

i. Multidisciplinary committee
ii. Undue Options
iii. NARS person available
iv. Limited facilities

**Import Process:**

v. Stepwise import by multinationals
vi. Phytosanitary integration

vii. Phytosanitary Integration
viii. Country Need analysis

**Marketing System:**

ix. Inclusive dealer
x. Flexible to Agri Extension
xi. Selection of dealers
xii. Company Training

**Disposal:**

xiii. Specification
xiv. Environmental and other acts.
xv. Duration of use
xvi. Techno-legal monitoring

**Question 3: Indentifying the plant pest symptoms in the context of Agro-commodities of Bangladesh:** Give tick mark to any 5 as most important

i. Grains ii. Fruits iii. Leaves iv. Nuts
v. Plants: vi. Seeds vii.Soils viii. Other Pests +++++++

**Rice pest: hoppers**

**Rice pest: egg/nymph**

**Rice dis neck blast**

**Rice dis Blight 1**

**Rice dis smut**

**Rice dis Leaf spot**

**Rice grain dis**

**Wheat grain dis**

**Wheat grain dis 2**

**Fruit scab**

**Fruit mealy bugs**

**Tomato mites rusts**

**Citrus mites/scab**

**Fruit/veg/cucumb fly**

**Coconut mite**

**Chili/okra virus**

**Potato blight**

**Chili/dahlia cucumbermites**

**Micro and giant mealy bug**

**Tomato leaf miner**

**Soil carried pathogen 1 Fruit grafts**

**Soil carried pathogen2 Spice plants**

**Soil carried pathogen3 ornamental plants**

**RESULTS AND DISCUSSION**

From the result it was found that Age group 25-35 years was 28% which was maximum, Age group 36-45 years was 24% which was second position, Age group 46-55 years was 28% which was third position, Age group 55-65 years was 17% which was fourth position and age group above 65 years was 13% which was the minimum.

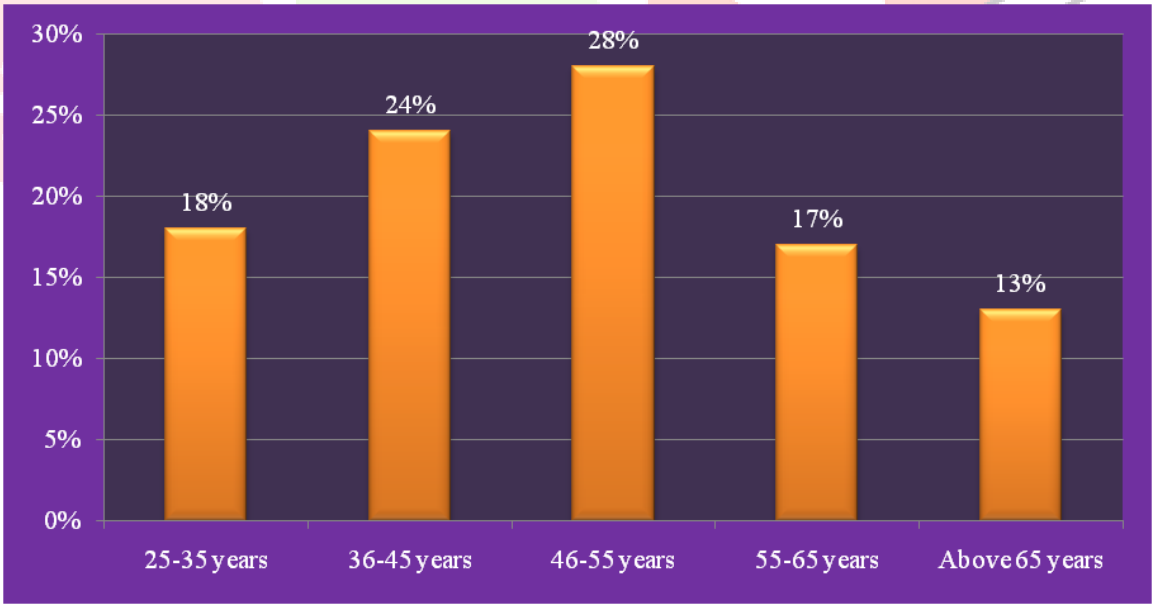



**Figure 1: age group of the respondents**

Source: Survey

From the above graph it was found that among 150 respondents 22% respondents were completed Bachelor level, 43% respondents completed masters leveland 35% respondents completed more than masters degree respectively.

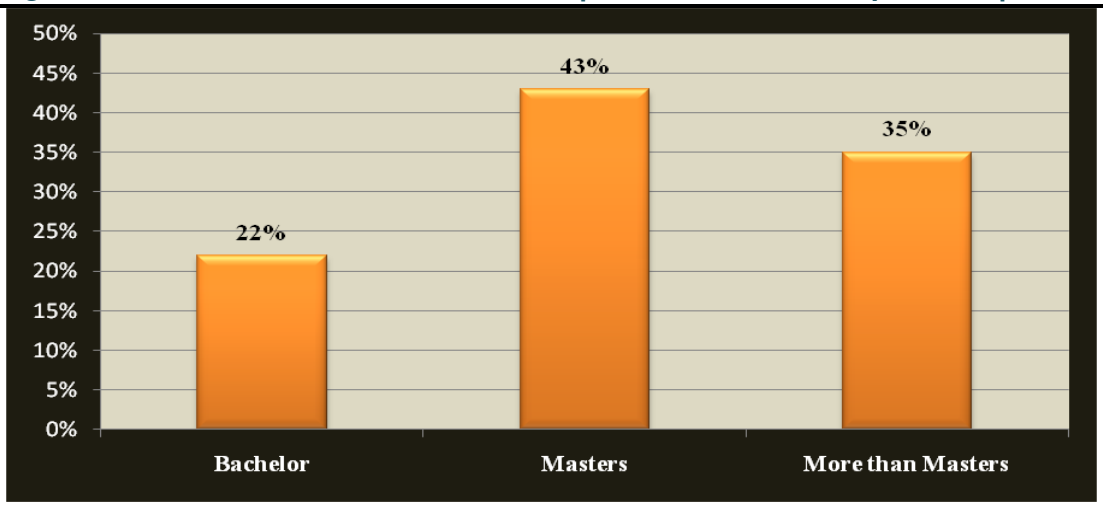



**Figure 2: respondents' education**

Source: Survey

Respondent's Residence area have shown in the above graph. From the result it was found that out of 150 respondents, 73.30% respondents lived in urban area and 26.70% respondents lived in rural area.

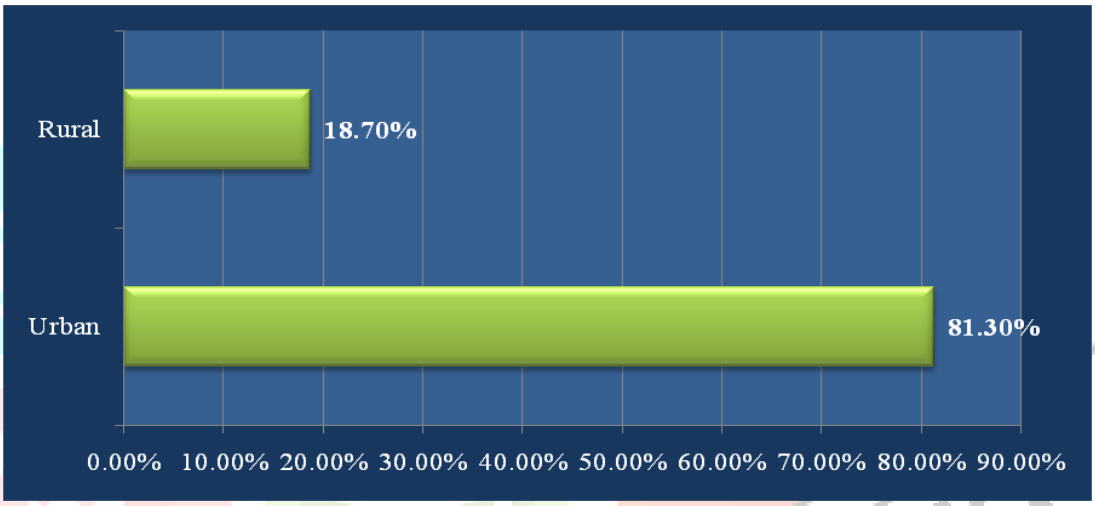



**Figure 3: respondents' residence area**

Source: Survey

According to the SWOT analysis results the point should be strengthen as high responded (51.3%) as highest test facilities by multiple teams at the ex-import quarantine center.

**SWOT Analysis of the present practices**

**Table 1: strength points**

| Parameters | Agri. PQ and PP Extension | Plant import Co. Managers Distribution | PQ and PP Teacher | Mean |
|---|---|---|---|---|
| Test facilities Port: Multi Team | 81 | 21 | 52 | 51.3 |
| Import : Stepwise import | 46 | 19 | 49 | 38.0 |
| Marketing : Flexible | 55 | 35 | 34 | 41.3 |
| Disposal: Environ acts. | 31 | 19 | 29 | 26.3 |
| Mean | 53.3 | 23.5 | 41 | 39.3 |

The results show that the overall response of these studies here was less responded 39%, which indicate negligence of the system in the country.

Source: Survey

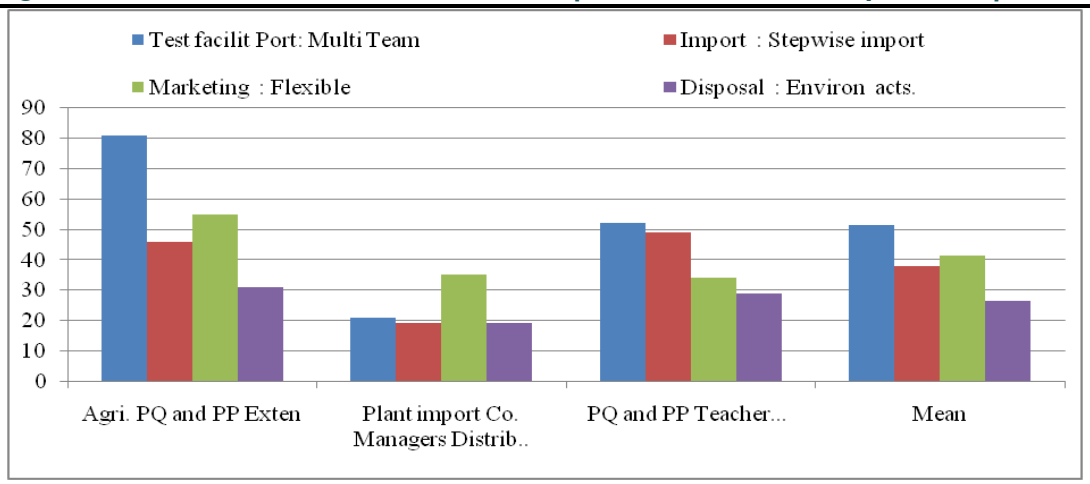



**Figure 4: SWOT analysis for the strength of the system activities**

Source: Survey

**Table 1: weak points**

| Parameters | Agri. PQ and PP Extension | Plant import Co. Managers Distribution | PQ and PP Teacher | Mean |
|---|---|---|---|---|
| Test facilities Port: Multi Team | 54 | 71 | 53 | 59.3 |
| Import: Stepwise import | 58 | 57 | 44 | 53.0 |
| Marketing: Flexible | 32 | 34 | 26 | 30.7 |
| Disposal: Environ acts. | 69 | 76 | 72 | 72.3 |
| Mean | 53.3 | 59.5 | 48.8 | 53.8 |

The individual mean results show that 76% respondent of plant import Co-managers indicated disposal and environmental act limitation as weak points of SWOT analysis matrix, which may be due to marketing flexibility.

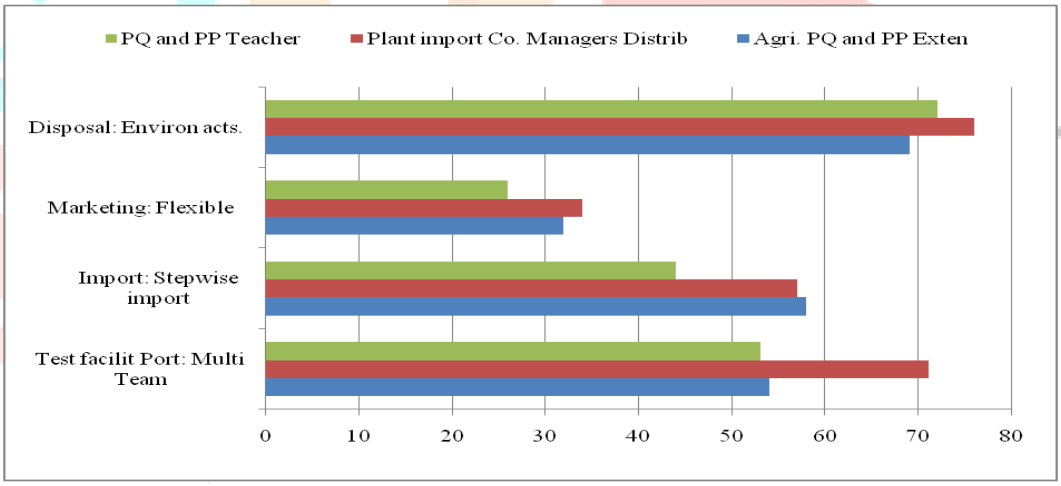



**Figure 5: SWOT analysis for the weakness of the system activities**

Source: Survey

**Table 3: opportunity points**

| Parameters | Agri. PQ and PP Extension | Plant import Co. Managers Distribution | PQ and PP Teacher | Mean |
|---|---|---|---|---|
| Test facilities Port: Multi Team | 74 | 73 | 38 | 61.7 |
| Import : Stepwise import | 48 | 69 | 63 | 60.0 |
| Marketing: Flexible | 87 | 62 | 67 | 72.0 |
| Disposal: Environ acts. | 64 | 55 | 31 | 50.0 |
| Mean | 68.3 | 64.8 | 49.8 | 60.9 |

The results show that PQ programs have highest opportunities in country as over all response of 60.9% and mean response up to 72%.

Source: Survey

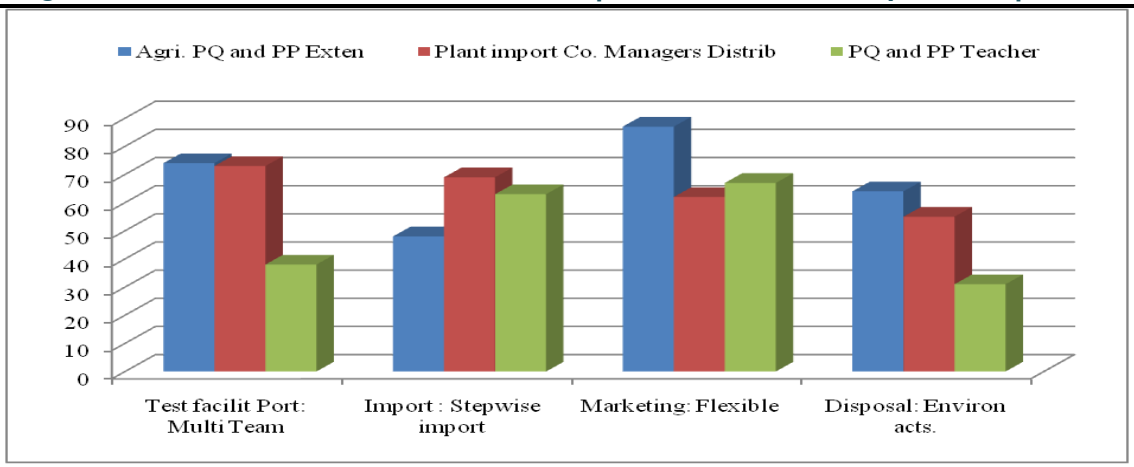



**Figure 6: SWOT analysis for the opportunity of the system activities**

Source: Survey

**Table 4: threat points**

| Parameters | Agri. PQ and PP Exten | Plant import Co. Managers Distrib | PQ and PP Teacher | Mean |
|---|---|---|---|---|
| Test facilit Port: Multi Team | 65 | 43 | 66 | 58.0 |
| Import: Stepwise import | 89 | 67 | 78 | 78.0 |
| Marketing: Flexible | 51 | 27 | 48 | 42.0 |
| Disposal: Environ acts. | 84 | 36 | 49 | 56.3 |
| Mean | 72.3 | 43.3 | 60.3 | 58.6 |

The results were in favor of stepwise import as threat by 78% respondents.

Source: Survey

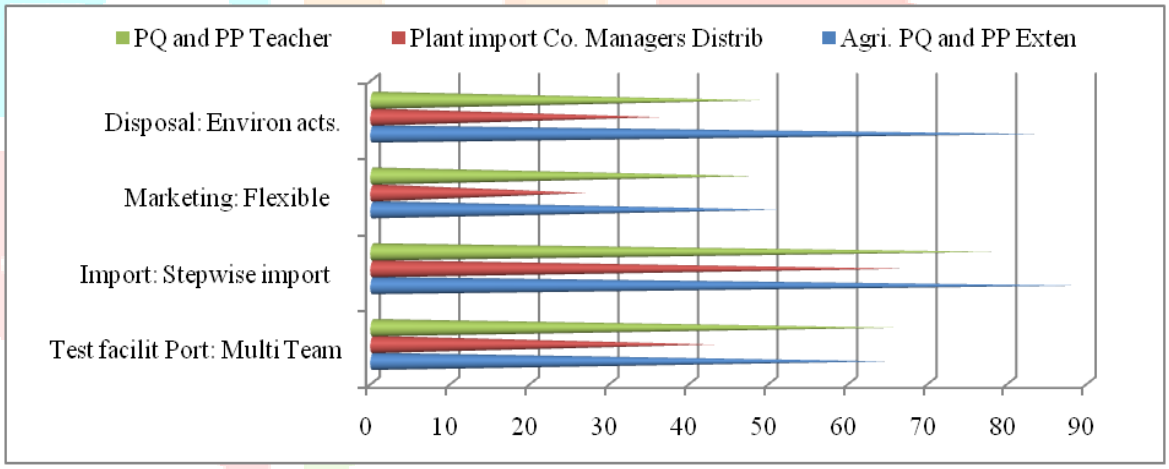



**Figure 7: SWOT analysis for the threat of the system activities**

Source: Survey

## SUMMARY AND RECOMMENDATIONS

### SWOT Analysis of the Present Practices

According to the SWOT analysis results the point should be strengthen as high responded (51.3%) as highest test facilities by multiple teams at the ex-import quarantine center.

The results show that the overall response of these studies here was less responded 39%, which indicate negligence of the system in the country. So the whole system of the Plant Quarantine should be oriented to the users and the stake holders.

The individual mean results show that 76% respondent of plant import Co-managers indicated disposal and environmental act limitation as weak points of SWOT analysis matrix, which may be due to marketing flexibility. So the marketing system should be made more consistent in favour of the clients.

The results show that PQ programs have highest opportunities in country as over all response of 60.9% and mean response up to 72%. The results were in favor of stepwise import as threat by 78% respondents. So, these types of opportunities should be more explored making it legally favorable for the users.

The results show that the test should do by multidisc committee (73.3%) and media and soil materials should be prioritized (70%) for checking pests.

The results on import process show that plant materials should be of the Phytosanitary integration process, as favorably scored by 71% respondents.

The Phytosanitary actions should be based on its marketing principles.

According to the results the marketing system should be for inclusive clients as scored by 75.3% respondents.

The disposal of infested materials technological monitoring 83% followed by need detail specification for plants.

The commodity symptom indicators should be illustrated as supported by PQ and PP teachers' fruits proper implementation.

**Recommendations**

- PQ system in Bangladesh needs more extension along with Food and Environmental, Commerce and Law Ministries cooperation.
- Testing facilities should be strengthening both HR and Lab capacity.
- PQ persons need intensive training with abroad PQ rules.
- Quarantine farms need to be established.
- Opportunities of PQ are most vital for agri-development, safe food and environment of the country.

**REFERENCES**


[1]. Aalen F H, Whelan K, Stout M (1997) (eds) Atlas of the Irish rural landscape. UP, Cork, 352 pp

[2]. Abad P., Gouzy J., Aury J.-M., Castagnone-Sereno P., Danchin E. G. J., Deleury E. et al. (2008). Genome sequence of the metazoan plant-parasitic nematode *Meloidogyne incognita*. *Nat. Biotech.*26 909–915

[3]. Alan MacLeod, Marco Pautasso, Mike J. Jeger, Roy Haines-Young, 2010, Evolution of the international regulation of plant pests and challenges for future plant health, Springer, Volume 2, Issue 1, pp 49–70

[4]. Baker, R.H.A. and MacLeod, A. (2005) Pest risk assessments: tools, resources and key challenges, p106-109. In: IPPC

[5]. DAE 2015. Plant Quarantine Centre, Seaport Chittagong, Plant Quarantine Wing (PQW), Department of Agriculture Extension (DAE), Chittagong, Bangladesh

[6]. EPPO 1978. Data Sheets on Quarantine pests: *Ralstoniasolanacearum*, EPPO A2 list: No. 58. Edited by Smith IM, McNamara DG, Scott PR, Holderness M. CABI International, Wallingford, UK

[7]. FA O (2007) ISPM No. 2 Framework for pest risk analysis, FAO Rome, 35 pp.

[8]. FAO (2013) ISPM No. 11 Pest risk analysis for quarantine pests, FAO Rome, 26 pp.

[9]. FAO (2015) ISPM No 5. Glossary of phytosanitary terms. FAO Rome, 34 pp.

[10]. Franco J. 1979. Effect of temperature on hatching and multiplication of potato cyst nematodes. Nematologica 84, 807-811.

[11]. IITA. 1981. Proceedings of the Third Research Planning Conference on Root-knot Nematodes, *Meloidogyne*spp. Ibadan, Nigeria: IITA.

[12]. Khan GA, Mian IH, Ahmed M, Kawser-e-Jahan.2006. Parasitic nematodes associated with root-zone soils of tea gardens. Bangladesh Journal of Plant Pathology. 22(1/2):41- 44.

[13]. Miller LI, 1986.Economic importance of cyst nematodes in North America. In: Lamberti F, Taylor CE, eds. Cyst Nematodes. New York, USA: Plenum Press, 373-385.

[14]. Miller LI, Gray BJ, 1972.*Heterodera solanacearum* n. sp., a parasite of solanaceous plants. Nematologica, 18:404-413.


**BIOGRAPHY**

Dr. Md. Ahsan Ullah is a Consultant, Pest Risk Analysis (PRA), Strengthening Phytosanitary Capacity in Bangladesh Project at Department of Agricultural Extension, Government of the People's Republic of Bangladesh. He has been working for Plant Quarantine and Phytosanitary Services in the Bangladesh since 2007. Mr. Ullah is engaged in research activities throughout his academic career more than 10 years and has published many research papers, participating international conferences. Mr. Ullah is a Life Member of the Krishibid Institution, Bangladesh.