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Biosecurity and Biosafety in Securing Plant Health

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Abstract

Plant biosecurity encompasses the policy and regulatory framework to analyse and manage risks in the sectors of plant life and health and related environmental concerns. It covers the protection of a country from pests / diseases during the trans-boundary movement of commodities, from emerging indigenous pests / diseases, from the introduction and release of GMOs (genetically modified organisms). Many international and national organisations are involved to adopt the concept and promote a specific work programme in relation to biosecurity and biosafety approaches. There are critical issues that need to be addressed which includes up-gradation of quarantine facilities, strengthening the risk analysis mechanism, development of the pest database, standard operation procedures and research prioritization. Biosecurity and Biosafety, therefore, present new opportunities for international cooperation and global governance. In the context of the current situation regarding the current risks and challenges, the international community must work together to avert threats, advance mutual interests, and safeguard global issues.

Introduction

Biosafety refers to the protection of ecology and human health. It includes the inhibition principles, technologies, and practices implemented to prevent unintentional exposure to pathogens and toxins or their unintentional release. It provides protection to laboratory workers, community workers and environment from the accidental exposure to biological materials. Whereas, Biosecurity mainly focuses on biological materials to reduce the intentional misuse of it. It is a strategic and integrated approach that encompasses the policy and regulatory frameworks that analyse and manage risks in the sectors of food production in relation to food safety; the introduction of plant pests, animal pests and diseases and zoonoses, the introduction and release of genetically modified organisms and their products; and the introduction and safe management of invasive alien species and genotypes. It also includes associated environmental risks protection, control and accountability for valuable biological materials within laboratories, in order to prevent their unauthorized access, loss, theft, misuse, diversion or intentional release. Though the countries have benefitted from an exchange or intentional / unintentional introduction of new species, it has not always ended up with beneficial results, some lead to disastrous outcomes. Few of catastrophes around the globe are the Great Famine of Irish, Toppling of Grapevine in Europe, Coffee Rust in India, etc. Invasive alien plant species are non-native species that spread and interfere in a new ecosystem by posing a serious threat to the native biodiversity, leading to economic loss. Invasive species don't allow local species to grow and

wildlife to move through. There are several insect, pests and diseases that were introduced into the country and now become serious threats to our plant health and environment. So, there is a need to secure plant health by adopting plant bio-security and bio-safety measures.

Components of Biosecurity and Biosafety

1. **Health** - Human health, Animal health, Plant health, Environmental contaminants.
2. **Security** - Biological safety, Economic and socio-political security, Cultural identity and integrity, National patrimony, Natural disaster preparedness.
3. **Environment** - Environmental impact management, Ecological systems, Natural Flora and fauna.
4. **Trade** - Development, Economic drivers, Safe trade.

International Organizations and Programmes Working on Biosecurity-Related Issues

FAO, Food and Agriculture Organization of the United Nations; UNCTAD, United Nations Conference on Trade and Development; UNDP, United Nations Development Programme; UNEP, United Nations Environment Programme; UNESCO, United Nations Educational, Scientific and Cultural Organization; WHO, World Health Organization; WTO, World Trade Organization

International-Level Intergovernmental Treaties Related to Biosecurity

BTWC, Biological and Toxin Weapons Convention; CBD, Convention on Biological Diversity; CITES, Convention on International Trade in Endangered Species of Wild Fauna and Flora; IPPC, International Plant Protection Convention; OIE, World Organisation for Animal Health; WTO-SPS, Agreement on the Application of Sanitary and Phytosanitary Measures of the World Trade Organization; UNCCD, United Nations Convention to Combat Desertification

Plant Protection Organisation in India

The plant quarantine legislation in India is aimed to protect the country from ingress of exotic pests during import.

- The Department of Biotechnology under the Ministry of

Science and Technology, through its various committees, takes care of the biosafety issues in dealing with GMOs and the issue of biological warfare is presently dealt by the Ministry of Home Affairs.

- Enforcement of Destructive Insects and Pests Act (DIP Act, 1914), promotion of Integrated Pest Management, implementation of Insecticide Act, 1968, monitoring and control of desert locust in the Scheduled Desert Area, providing the information through different trainings are the key role in Plant Protection.
- The Central Directorate of Plant Protection is functioning with the support of 87 Sub-offices: 29 Central Integrated Pest Management Centres, 35 Plant Quarantine Stations, 2 Regional Pesticides Testing Laboratories, 29 Locust Control Stations, and 1 National Plant Protection Training Institute.

Factors Affecting Biosecurity (INFOSAN, 2010)

- Globalization.
- Modern agricultural production and new food processing technologies.
- Expansion of trade in food and agricultural products.
- Legal obligations for signatories of relevant international agreements.
- Increase in the movement of people across borders.
- Advances in communications and global access to bio-security information.
- Greater public attention to biodiversity, the environment and the impact of agriculture on both.
- Shift from country independence to country inter-dependence for effective Biosecurity.
- Scarcity of technical and operational resources.
- High dependence of some countries on food imports.

Ways for Improved Global Biosecurity and Biosafety

- Survey and surveillance of diseases / pests of national and international importance to have endemic pest data.
- Generation of comprehensive epidemiological data on important pests so that *tolerance limits* can be defined, to develop PRA and to identify PFAS as per the WTO norms.
- Development of diagnostic protocols using molecular techniques for the detection of exotic pests.
- Promoting the development of digitized keys for identification of exotic pests.
- Evaluation of the biosafety risks in the import of transgenic and beneficial biocontrol agents.

- Development of methods to detect the presence of transgenic/ GM contamination (deliberate or inadvertent mixing of GM seed with non-GM seed) in unknown samples during quarantine processing.
- Sharing of scientific data, risk assessments, other methodologies and technical resources, especially with developing countries.
- Improving the exchange of information.

Conclusion

Biosecurity and biosafety programmes continue to receive inadequate attention across the globe that leads to disastrous unaffordable loss to the global environment, agriculture and biodiversity. In the present situation, maximisation of the food production to meet the requirement of a large number of populations and to gain maximum profit is necessary which depends on programmes

of biosecurity and biosafety. Investment of resources and approaches in a systematic manner to establish bio-security and biosafety program is the most effective option to achieve food security goals, control and/or manage risks related to plant health, animal life and environment.

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