

BIOSECURITY FOR AGRICULTURE

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Abstract

As per the growing size of population and related food dependence is the most vital problem associated with the developing nations. To meet the needs of the nation-wide people demand for foods, feeds, and fibers it is necessary to protect crops and plants from both intentional and unintentional threat. There are many threats associated with the agriculture system which ultimately will affect its sustainable production. To overcome all the threats related to agriculture introduction of Biosecurity method is used to protect or diminish the transfer of contagious diseases in crops and live stocks and is first used by United States. Most common challenges faced for agriculture biosecurity that can be seen among all natives, local and world-wide level are population growth and poverty, Globalization, Change in climate, varying agriculture infrastructure. Few other problems for agriculture bio-security are deficiency of proper communication network for combined diagnosis and the expansion of national and world-wide technological protocols to enhance fast world-wide development. Government or legislations should organize some educational programs to develop a proper understanding of agriculture biosecurity among farmers. From the implication of biosecurity in Agriculture, various contagious diseases can be detected on time, provide proper information for climatic change and other risk associated with agriculture. It will also provide proper trading between the two countries easily and can be used further for early detection of crop health, its harvesting time and can also be used for guiding the farmers, a suitable strategy to protect their crops for invaders..

Key words: Agriculture, Biosecurity, Development, Diseases, Farmers, Practices, Problems, Sustainable, Threats.

Introduction

Agriculture is the largest industry in the world in terms of land utilization and is the sole supplier of human food with a global distribution of around 40% of available land. Farming show a key role to enhance a country's economic development[1]. In addition, crop food products make up approximately 78 percent of the world's mean per unit of population energy requirements, while other bases of food are egg, milk, and meats are in another 20 percent of the world's average population requirements[2]. The growing population's food requirement is therefore the fundamental necessity and can be attained only by enlarging agricultural production. Sustainable society components are the natural and agricultural plant systems. Many companies' success or failure has been dependent upon their plant systems' health [3]. There have been many instances in history of human outbreaks of infectious diseases that originates social conflict and political uncertainty. The effects of plant disease outbreak can be significantly dissimilar from those of human structures, and the causation for political uncertainty can be less understated[4]

Plant system is surrounded by many threats and have a higher chance that they will occur [5]. The risk of these hazards has dramatically increased with advances in technology of science and communications, increased transport of human beings, plant and plant goods and rising damages due to plant pathogens being brought into or compatible with the trade partners intentionally, and contributing to worldwide food safe keeping. In different contexts, the term Biosafety is used widely. Often, the definition differences depend on the scale of the system being considered. Security is regarded as a phase of readiness and provide the following explanations: 1) lab scale biosecurity is a situation of preparation which guarantees that definite organism cannot run away carelessly from their workroom; particular organism cannot be remove from the laboratory without approval; 2)

geographical biosecurity, a condition of preparation that guarantees that particular organism is contained within a defined area and/or are excluded from a defined area by specific organisms[6].

In the United States, the term biosafety had been used until recently mainly to define a methodology that helps in preventing or decreasing the communication of infectious disease in harvests and animals. Instance of karnal bunt fungi (a wheat-infected disorder), soybean roasts, and base and door conditions are all known as biological weapons against American agriculture. However, more and more efforts to prevent the intentional and unintentional harm caused by the introduction of creatures into human fitness and environment, and also to agriculture and livestock industries were being made under the term bio-security[7]. Biological risk assessment in agriculture and food sector is utilizes to explain the practical discussion because it is hard to interpret biosecurity in any specific languages and also discuss all other difficulties associated with it in different parts of world but after experts consultations of Foods and Agriculture association of United Nation, the concept behind the biosecurity can be better understood. Biosecurity is a novel concept and is still under progress to identify its further application for future recommendations.

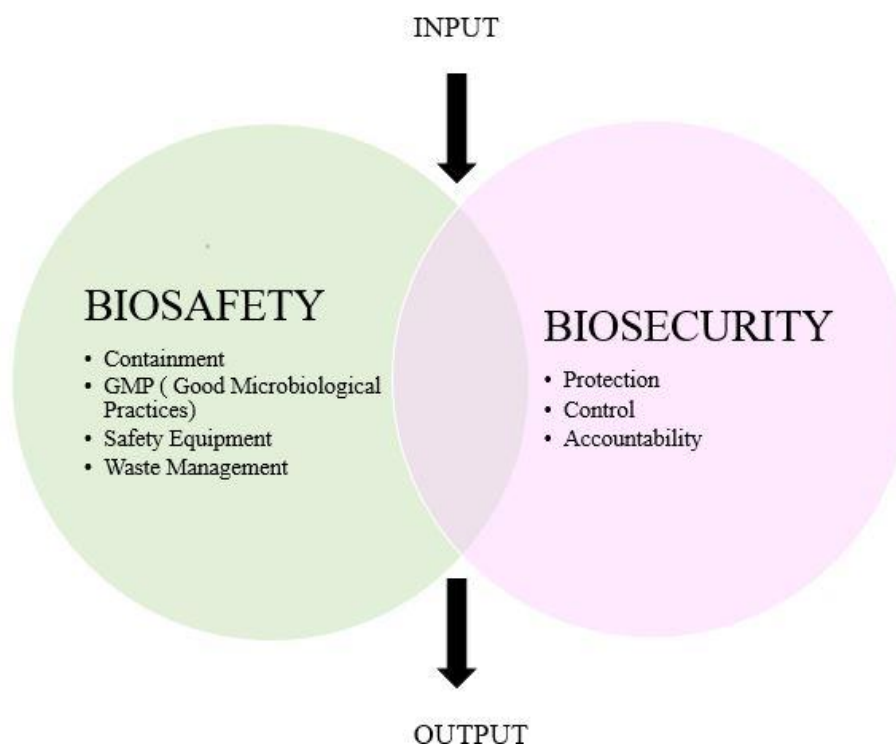


Figure 1: Management Goals of Biosafety and Biosecurity for Any Bio-Risk

From the above Figure 1, the difference between biosafety and biosecurity is clearly illustrated with the definition of Biosafety that it's a safety from un-intentional dispersion of disease causing microbes and biohazards to the human and the environment while Biosecurity is the process of safeguarding human and environment form the intentional release of pathogenic microbes and biohazards. For the duration of 20 year of the start of the green revolution, food production existed doubly increased in India. The increase in chemical fertilizers and pesticides, respectively, was obtained by sevenfold and 375 folds[8]. In addition, the enlarged accessibility of unrestricted and sensitive chemical species varieties (such as nitrate, phoxylate, ammonias, chlorides and heavy metals content) in the soils structure has led to an increase in excessive agricultural input caused by environmental pollution. The main task for an Indian culture is therefore to nourish the rising residents (i.e. food safety), then to use natural resources in a wise fashion, to maintain socioeconomic balance (in terms of market, livelihood, and yield) and to incorporate conventional understanding and efforts into resources[4]

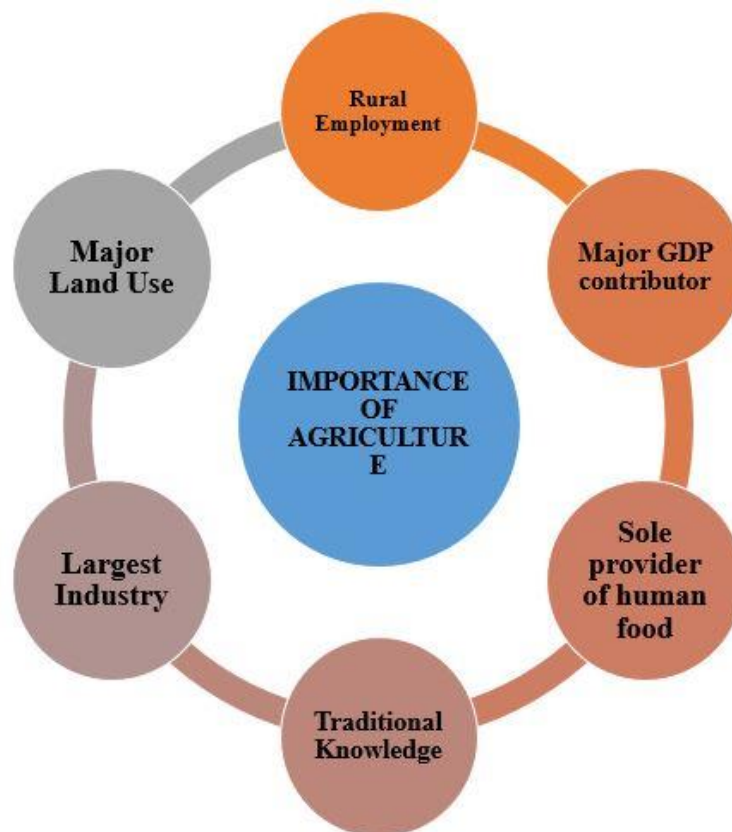


Figure 2: Resenting the Agricultural Importance in Various Sector

From the above Figure 2, agriculture show a major contribution of a nation in the field of economic development by contributing one of the largest industry of a nation and also is a major contributor for nations GDP, increase employment by providing jobs for both skilled and non-skilled person, contribute a major role on providing food to humans all over the world, largest industry known till know, agriculture uses maximum land of the nation, and also contribute for conventional knowledge to the farmers. Some of the major problems associated for the implementation of Biosecurity and strategies choices and actions for agriculture-food security are described in the below diagram-



Figure 3: Shows all the Challenges and Policies Option for Agro-Food Security

From the Figure 3, all the major problems and strategies options for the security of agriculture-based foods. Major challenge for biosecurity is the enhancement of hunger and poverty in the country for sustainability of

such huge large populations we need to produce more agricultural foods. For an efficient production of goods farmers should be provided a developing and appropriate technology for improving the efficiency of inputs. Should implement Bali road blue print for climate change problem and establishing a regional biosecurity shield equipped for early detection of forecast for the management of risk associated and also develop connection between the farmers and the market area. Government and policy makers should provide resources, technologies and various schemes and policies to enhance remote farmers.

1.1.Diversification and Poverty

Agriculture diversification towards high value activities, for example horticulture and animal farming that generate higher returns that match smallholder farmers' resources and income need who assign larger areas to high-value crops and also make production more productive than larger farmers. The greatest impact on marginal and smallholder farmers is less poverty among those engaged in these enterprises. This means that technology-driven diversification, markets and policies can be an important way to boost farmers' incomes, create jobs, sustain farm growth and reduce poverty.

1.2.Livestock Policy and Reforms

The livestock sector remains underinvested and neglected by financial institutions (credit and insurance) and support services, although it has considerable potential for enhancing and sustaining farm growth. The sector receives currently hardly 10% of public expenditure and 5% of loans for agriculture. Furthermore, our feed demand estimates would help reorient the food management policy and optimize the population of livestock. The estimates of the positive environmental contribution of cattle justify more livestock development resources. In view of specific regional needs, tenancy acts of different States should appropriately be modified. Leasing land should, to the greatest extent possible, only be allowed by SMEs, while encouraging large farmers to take on non-fertile enterprises.

1.3.Reforming Markets

Price policy and market reforms should: (i) increase market competition, by linking farmers to markets through institutional developments, such as contract farming and producer associations; (ii) promote infrastructure investments (road, electricity, and communication), reducing costs for transportation and transactions; (iii) to encourage the private sector to invest in agro processor, cold storage facilities, cooling transportation and retail chains to enhanced value chain efficiency and minimize post-harvest losses; and (iv) Enhance access by farmers to inputs, information and services on credit.

Some of the major problems associated with crop-biosecurity is connected by plants that are cultured for foods, feeds, fibers, and fuels. Alertness on the way to confirm the harvest and feasibility of the system is opposed through a broad range of indirect and direct encounters of small or extensive time period. Few problems are noticeable in existence and its impact can be easily be measured like the pathogens with cause disease although some others are unclear in environment and special possessions like world-wide trade agreement. Few important effective crop security plan is developed by all nations to enhance the capacity of producing food.

Literature Review

[Waage](#) et al. [9] describe the stoppage and controller of the introduction of new pests and diseases is an agricultural and interest-bearing challenge. This concern is partly due to the impression that the threat is growing, but the changing rates of the threat to biosecurity have been little analyzed and there is no clear signal. Traditional animal and plant biosecurity systems vary greatly but converge nowadays. Bio-economic risk modelling, a worthwhile implement to guide the allotment of restricted biosecurity assets. New technology and increasing role in the private sector will greatly affect the upcoming prevention and management method. Overall, today's bio-security systems are called into question by changing national trade priorities, new environmental concerns about biological attacks and the demand of "Who is going to suffer?". Systems tomorrow might have to be relatively variable with respect to its effectiveness. It was proposed that distinct changes are of three different types: integrating biosecurity between plants and animals into a single, proactive,

risk-originated method; focusing more on world-wide collaboration to address dangers associated with sources, and commitments to resisting bio-security, rather than building walls around agroecosystems, to building resiliency.

Meyerson et al.[7] describes that biosecurity itself is greater than a catchword; it is the key effort of plan, determinations, and arrangement to defend human being, animals, and environmental well-being in contrast to biological dangers. The chief objective of biosecurity is to defend contrary to the danger stood by disorders and creatures; the main instrument biosecurity are prohibiting, abolition, and regulation, maintained by knowledgeable organization supervision, applied procedures, and the fast and effective safeguarding and distributing of vigorous data. The dangers of rupture in biosecurity will remain increase, and the significances can turn into more recurrent and serious as ecological variation, modernity, technical growths, and community based tensions rise. To uphold bio-security, major consideration should be to plans for the hindrance and quick finding of, as well as quick reaction to, damaging and possibly damaging creatures. Definitely, legislators will pursue to assess the cost like technologies, personnel, accommodations, and possible negative public view regarding regulatory mechanism in contradiction of the profits like financial investments from damages and favourable communal view concerning secure principles. Biosecurity is for that reason of the summation of risk controlling performance to defence in contrast to biological dangers.

J. P. Stack [10] discovered that the basis of food production method is plant system and therefore, play a chief constituents in the development of sustainable society. To maintain sustainable environment at its balance condition various threats related to the plant system are to be shorted out. There are many problems related with plant biosecurity at global, regional and local scale. All problems related with plant biosecurity are increase in size of population, globalization, climatic variation, bioterrorism and bio-crime and varying infrastructure related with agriculture business.

Other problems associated with biosafety of plants includes the requirement of proper communication networks for the cooperative diagnosis, the establishment of countrywide and international technology policies to enhance the quick worldwide development of suitable diagnostic technologies and consistent procedures, and the requirement of educational programs to elaborate the role of plant biosecurity for sustainable development. To maintain continuous providing of feed stock, fiber, and food, every nation should need to improve a plant bio-security arrangement and is also fairly essential to expend a world-wide frame work for collaboration that will help to maintain plant biosecurity without negotiating trade.

Vaughan Higgins et al.[11] describes about the international attempts to stop the expansion of all biological threat related to mass production of agricultural-food are progressively being delegate from country's legislation to agricultural business and cultivators. Prior findings has emphasized all the ground-position and institutional difficulties associated for the engagement of farmers for plant biosecurity. Though, small is recognized sociologically about what is already known to farmers and are they able to control all risks associated with diseases, and most importantly how they follow the plant biosecurity. The issue by the use of theoretical efforts on the blueprint of maintenance. From the categorical findings of Australian beef industry for making biosecurity workable, framers' traditional methods for their herd health and farm play a major role in it. After involving two key practices that are skilled craftwork and fluid engineering, farmers give major contribution for national level livestock biosafety ideologies and performs. For an effective engagement of farmers in biosecurity governance, there is high understanding of the localised practices of biosafety.

Michele Graziano Ceddia et al. [12] describes one of the constituents of biosecurity that protect plants from various offensive foreign species, which are among in the major threats throughout the world to innate biodiversity and commercial effectiveness in numerous fields, containing agriculture. Though, agriculture farmers are not same throughout the world. They might have diverse goals and priorities, may utilizes diverse technology, and can attain different patches of land. In the condition if farmers show variation in terms of their behaviour to invading pests and harm they originates, there are perhaps some outer effects in the conformation of the pest disperse effects and succeeding harm produced. Study shows the effect in the situation of two manufacturer's varieties that are profit-aspired professional manufacturers and utility-aspired hobby manufacturers. The hobby-aspired producers initially define a breeding base to tackle with the problems

associated with pests, less investment for pest regulation and as well as after discussion on possible strategy tools to precise this market disappointment and highlight the significance taking distinct stakeholder and their dissimilar inducements when scheming strategies to regulate offensive species.

[Damian Maye](#) et al.[13] explains of biosecurity which generally comprises of common statement of how all the risks related to biosecurity can be achieved and checked. While in reality, biosecurity practice on farm are different and transmitted in a different way among communal groups, geographical scale and agriculture product chain. From the findings from social science it is examined the biosecurity for animal well-being in farm. Behavioral and psychosocial prototypes of specific farmer behaviour or decisions. Behavioral methods are distinguished in biosecurity strategies but show inadequate behaviour as of an effort on distinct farmer behaviour and intention. Evaluation of environmental and georgic sociological effort that highlights communal and cultural organizations, frameworks, and standards to direct virus actions. Sociological methods attain the ability headed for enhancement in the commonly used behavioral methods and donate for enhanced manufacturing of biosecurity strategies and on farm practices. This comprises of enhancing the knowledge of good farming and its relatable knowledge as localized practice for remedy. By on farm practice of biosecurity will help framers to manage and control disease on farm.

Rishikesh et al.[4] elaborates the knowledge of green revolution and outcome from socio-economic factors related with green revolution and component of environment. Problems associated with modern agriculture practices are food security, decrease in soil quality, limited resources, and imbalance in nutrients have also remained discovered. Farming is grounded largely on environment and living on-farm established input by enhancing soil miniatures to environmental miniatures is done by the people for its long term use for sustainable development. It is important to combine traits of people, plant and profit as a single objective. The variation in the view-point of people for seeing cultivation as a financial systems to biological systems considered as the chief problems. Appropriate addition of modern agriculture farming and variations required for shielding the communities of farmers must be confident in the upcoming future and major impact due to climatic variation should not be overlooked. Hence, proper policies and agricultural practices require to establish for shielding of the farmers community like minor landholders, from the quick damages through dangerous occasions.

Discussion

Agriculture is the largest industry and contribute approx. 40% global distribution and also play a pivotal role in the economic development of the country. Crops food items contribute 78% of the total energy needs of the world and rest 20% is contributed by milk, egg, meat and any other. Farming show a significant part in a financial growth of the country. The enhancement in population size require more food and to meet their needs more agriculture production should done and is always a challenge for the development. India only spends 0.4% of its GNP on agricultural research, which is much lower than developed countries. There is enough evidence to indicate that the rewards for agricultural R&D investment are very attractive. Agricultural research investments must continue to push yield borders upwards, lower production costs and improve the resilience of production systems. To enhance irrigation efficiency, a switch from conventional practices to new irrigation technologies with institutional and policy support. U.S government invest approx. 4 billion dollars for their countries famers and for the future of the nation. The US Government invest approx. 200million dollars for biosecurity surveillance system and for better analysis of marked critical biosecurity risk. Biosecurity investigation system assist the section identity and react to biosecurity threats and offer signals to display free from pest and disease to maintenance market entrance.

Expansion of the biosecurity effort of Native Guards and upraised biosecurity consciousness throughout the world by target based messaging and funding of public occasions. Biosecurity effects each person– to retain a ‘Maximum Watch’ to detect and account possible biosecurity dangers and this will allow to develop faithful associations with the agricultural zone and motivate the participation of main industries and stakeholders in biosecurity activities. Proper champions and ambassadors engagement that show connection with agriculture sector and awareness is done by several awareness product like videos, media and funding required community occasions.

Improved analysis, collection, distribution, and monitoring information of the biosecurity surveillance by creating a web page that includes community which can be used to report weeds, pests, and disorders. Larger alertness of biosecurity assist to decrease the degree of danger establishing world-wide and show an application in agriculture industry and economy. The Native Guards program generates employment, training, and career pathway for Native people in terrestrial and marine supervision. Investment in laboratory infrastructure which have some diagnostic equipment and is funded research for both pest and disease. This will benefit to emphasis biosecurity determinations on region of great risk, to defend our prime production and valued export.

Green revolution dependent new farming practice have cause a sequential growth in crop harvest at the same come of usual source deprivation. Externalize in agriculture direct to a significant drop in soil fertility and environmental elasticity. There are numerous dangers to agriculture system that place sustainability at danger. Numerous problems are to attaining agriculture biosecurity at the native, community, and worldwide level. Problems associated with agriculture bio-security comprises of growing population, world-wide development, variation in climate, bio-terrorism and bio-crime, and varying farming industry organization. Extra problems contain the necessity for communications systems to allow cooperative diagnosis, the expansion of domestic and global technical policies to encourage fast worldwide placement with suitable analytical techniques and uniform practices, and requirement for learning broadcast concerning the significance of agriculture bio-security for sustainable development.

3.1.Benefits of the work include:

- Upholding enlarged, or upgraded, distribute market entrance
- Improved biosecurity investigation actions that well mark, discover and achieve exotic pest and disease, and offer larger proof of area independence from pests and diseases
- Improved capability and competence are well prepared to recognize and achieve biosecurity dangers
- Improved shareholder engagement that has enhanced biosecurity consciousness and knowledge on biosecurity observing and broadcasting.

It is key for each country to grow an agriculture biosecurity organization that safeguards a harmless and continuous streaming of foods, feeds, and fibers. It is similarly significant to grow an international outline for collaboration that upholds agriculture biosecurity without negotiating trade.

Conclusion

Deliberately or accidentally, undesirable pest and disease might be hosted. Unintentional introduction naturally contaminants through plants or animal resources, that are the base of most agricultural problems. In reverse, numerous introduction of pests like numerous hostile plant, fish and mammals which is now intimidating environmental assets were considered introductions which had not estimated an influence on biodiversity and ecosystem handling. Rationally, these diverse threats will vary in inhibition policies. Deliberately introduction will bring amplified dangers as they are vigorously fortified to found themselves, or at least to attain continuity. Constant introductions are largely firmly measured on the risk. Today biosecurity system is not likely to transform fast. Numerous of them are now 'locked' in worldwide contracts thus to execute severe trade authorizations on variations. Nonetheless the prices of running this organization convert better with further recurrent violations, extra exclusive trading damage and abolition plans, there will be growing stress to perform extra proactively and preventively in order to combine effort to check new pest and disorders at their origin. An essential characteristic of this unavoidable development of bio-security structure will be new science that promotes monitoring, modelling, and detection of dangers associated to biotechnology for animal and plant opposition. Further, bio-security will offer appropriate trading between the two nations comfortably and can be used further for primary detection of crops health, harvesting time and for guiding the farmers, how they can protect their crops from invaders

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