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Plant Biosecurity Governance Dilemma in Pakistan: The Case Study of Khyber Pakhtunkhwa

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Abstract

Plant biological insecurity is a globally recognized existential threat to plants and human beings. The world security community has framed legal codes to ensure it. This article comprehensively discusses the existing plant biosecurity governance paradox in Khyber Pakhtunkhwa province of Pakistan particularly and in India generally. It discusses plant biosecurity governance within the non-traditional security framework. It also sheds light on the various plant biosecurity governance issues and in Pakistani society and in the South Asian region. It also highlights how the traditional security has affected the plant biosecurity in Khyber Pakhtunkhwa. On the basis of empirical data, various recommendations are suggested to ensure plant biosecurity in its letter and spirit.

Key Words: Plant biosecurity; Plant Quarantine Act; Traditional Security; Non-Traditional Security

Introduction

The use of biological agents against humans, animals and plants has a chequered history. Agro-terrorism has remained profound significance area for both state and non-state actors. History reveals that pests and plants have been used as weapons against the enemy. In past, agro-terrorism has limited its consequences due to poor transportation system and poor technical know-how. However, in modern times, due to the technological advancement and modern rapid transportation, agro-terrorism has become a global plant biosecurity issue. In different periods and at various levels, different institutions have formulated plant protection laws to counter agro-terrorism. However, these plant protection legal instruments are not implemented in letter and spirit which have exacerbated the threats of agro-terrorism in Pakistan particular and in the South Asia general. Plant biosecurity governance is earnestly needed to ensure security of individuals by discouraging the agro-terrorism not only in Pakistan but also in the South Asian region.

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Conceptualization of Plant Biosecurity

The traditionalist security thinkers emphasize on military use of plants and pests to damage the agriculture sector and economy of the opponent nations (Keremidis, 2013,pp. 1&2). In the light of both realist and liberalist security paradigms, human beings also need security against agricultural terrorism. In simple words, plant biosecurity is needed to ensure the societal security at large. The realist thinkers consider the global relations among nations as 'colliding billiard balls'.

Traditional Security paradigm studies biosecurity from the threat perception emanating from using Weapons of Mass Destruction (WMD) such as pathogens during warfare as weapons by one state against other state or states (Keremidis, 2013). It also weighs the risks attached to the use of pathogens. These risks gain identity as a security issue by the state and its institutions on the basis of intensity of risks and lethality of pathogens. These institutions design strategy to securitize the referent objects or the targets of pathogens are being used. Malcolm R. Dando stated that during cold war the developed countries had launched the offensive bio-weapon programme. America also developed its offensive-biological weapon programme (Dando, 2002). In addition to this, he quotes Dr. Christopher Davis, UK ex-defence intelligence scientist, who says that 'we are firmly of the opinion, by the time we reached the mid-to-late 80s, that the Soviet Union had a substantial clandestine offensive biological weapon programme (Davis, 1998; Dando, 2002, p. 57).

The advocates[i] of liberalism like Robert Keohane and Josef Nye challenged classical realism and emphasis on interdependence among states, transnational relations and non-state actors (Reus-Smit, 2005, p. 189; & Keohane & Nye, 1972). They are of the view:

International relations should not to be envisioned as a system of 'colliding billiard balls'. It is a cobweb of political, economic and social relations binding sub-national, national, transnational, international, and supranational actors(Reus-Smit, 2005, p. 191; Keohane & Nye: 1972).

From liberal security paradigm point of view, globalization has mixed-blessings because if it has made the world like one community by shrinking the geographical distance among the nations due to fast communication and transportation system. On the other side, it has also exacerbated the security risks among the nations. In prevailing security risks, plant biosecurity is also an alarming security risk. This is reason that plant biosecurity governance has gained an international identity and the international community has drafted

various laws and conventions to securitise threats to plants emanating from pathogens or pests (Hoyt and Brooks, 2003/4).Francis Fukuyama takes into account the domestic factors for conflict management. Regarding Fukuyama's view about eradication of international peace and security arrangement, Scott Burchill says:

Human progress is largely depended upon elimination of international conflicts by following the principle of legitimacy by nation-states in their domestic or national politics. This inside-out approach towards global politics explains the internal political arrangement of the states. Their respective national political orders also help to understand their behaviour in global political relations (Burchill, 2005, p. 57).

The liberalist security thinkers are of the view that the revolution in the fields of bio-technology and micro-biology has augmented bio-terrorism because the bio-weapons have become locally produced commodities. P. R. Chari is of the opinion:

There is an urgent need to cope with the threat of bio-terrorism. In this regard, efforts should be made at international level. Bio-weapons manufacture is progressively becoming indigenised and less dependent on foreign suppliers for procuring materials, technology and equipment (Chari, 2005, p. 32).

Similarly, Gurmeet Kanwalopin that the development with accelerated pace and saturation of expertise in the field of biotechnology has considerably lessen the technical hurdles from the way of terrorists to acquire pathogens for a catastrophic bio-terrorist attack (Kanwal, 2005, p. 61; Meselson, 2000). Kendall Hoyt and Stephen G Brooks also highlight implications of globalization on bioterrorism and biosecurity. They also emphasised the rapid development in the field of biological technology and its repercussions on the world in era of globalisation. They say that 'the saturation and development of the biotechnology industrial sector at global level has seriously jeopardized the efforts made for the containment of proliferation of bio-weapons' (Hoyt and Brooks, 2003/4, p. 145).

Suresh Kumar takes biological security from two perspectives—biosafety and biosecurity. He highlights the biological agents in a broader perspective including animals and plants. He sheds light on the constructive role of biotechnology. He discussed various sub-branches of biotechnology like industrial, agricultural, forensic and environmental. He endorsed the impracticability and non-implementation of the biosafety and biosecurity rules in many countries (Kumar, 2012). He considers essential to adopt and

execute the biosafety rules for the protection of both humans and environment from any hazardous situation (Kumar, 2015).

The constructivist security paradigm helps to explain plant biosecurity. The constructivist theory[ii] of international relations owes to Onuf. His work did not negate Alexander Wendt who realised in his famous article 'Anarchy Is What States Make of It', 1992 (Zehfuss, 2004, p. 11, Waever, 1997, p. 4). According to Alexander Wendtthat international politics is the outcome of construction rather to be given, as identities and interests are constructed and supported by inter-subjective practice (Wendt, 1992, p. 183).

To Zehfuss, the epicentre of this paradigm is identity. The inter-subjective structures give meaning to things. Even collective identity comes out from it (Zehfuss, 2004, pp. 12 & 17; Wendt, 1992, p. 397; Wendt, 1999, p. 21).[iii] In addition to objective and subjective aspects of security, the concept of security is also discursive in nature. A 'Speech Act Theory' of linguistics helps to understand it. According to Copenhagen School, security is a 'Speech Act'. State functionaries announce emergency with the utterance of the word security and use all means to counter the existing threat (Buzan, 1998, p. 21). This leads to Ole Waever's famous 'Speech Act theory' (Booth, 2002, p. 222; Waever, 1995, pp. 46-86). Original idea of a Speech Act owes to J. L. Austin. He mainly developed the idea of 'performatives'—kinds of actions and not only statements (Buzan, 1998, p. 26; Emmers, 2013, pp. 135-6). Ken Booth while quoting Ole Waever, highlighted:

In linguistic, a 'Speech Act' refers to the process of Securitisation. Security utterance is an activity in communication to affect the receiver of the message. Naming or declaring something a security is the attachment of significance to those existential threats and also urges for taking necessary steps to counter those threats (Buzan, 1998, p. 26; Booth, 2004, p. 108).

In simple words, Copenhagen School considers security as a 'self-referential practice' (Buzan, 1998, p. 24). It connotes that all issues whether social, political or economic are security issues. It depends upon audience that what seems to them as a security threat will be called as security (Buzan, 1998, p. 34). The concept of security in the 'Speech Act' approach centers on three types of units (Buzan, 1998, pp. 35-6).

a. **Referent Objects**-- the object that needs security or whose security is felt by the securitizing actor.
b. **Securitising Actors**-- the actor or actors which are responsible to provide security to referent object(s).

c. **Functional Actors**-- there are those actors who affect the dynamics of a sector, (Buzan, 1998, p. 36) or actors that influence decisions (Buzan, 1998, p. 42).

Putting the plant biosecurity in the constructivist security paradigm, it may be said that in the post 9/11 the pathogenic terrorism by non-state actors as a threat perception has gained a global significance. The global security community has accepted it as a threat to plants and human beings. To counter this looming threat, United Nations Security Council Resolution 1540 was passed in April 2004. Kendall Hoyt and Stephen G. Brooks opined that in the pre-9/11, the global security experts and health communities had consensus about the threat posed by pathogens (Hoyt & Brooks, 2003/4, p. 124). The world community accepted biological weapons as comparatively cheap and surreptitious modus operandi of inflicting large scale human casualties (Hoyt & Brooks, 2003/4; OTA, 1993, p. 53).[iv] Due to its expanded devastative role, the discipline of biotechnology has been labeled as 'agent of mass destruction' (Hoyt & Brooks, 2003/4; Steinbruner, 2003, p. 124). The Speech Act Theory wields TSP and NTS paradigms

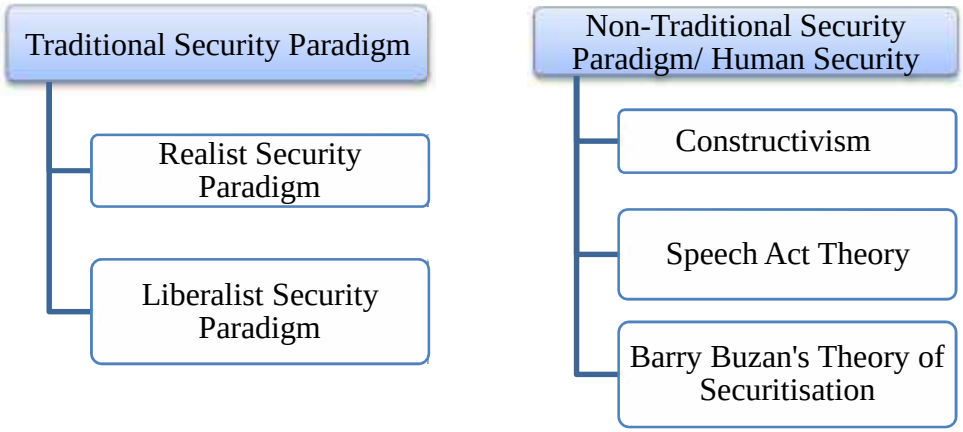
Barry Buzan has broadened the horizon of the non-traditional security paradigm and introduced a multi-sectoral concept of security by giving a multi-sectoral concept- military, political, economic, societal and environmental- the three levels of concepts was predominant in international relations (Rourke, 2005, pp. 57-96; Khan, 2014, p. 63). Selection of sectoral approach is helpful for analysis(Rourke, 2005, p. 8; Buzan, 1998, pp. 22-23). In support of Barry Buzan's referent object concept, Ken booth states:

Politics and security always revolves around man being a referent object. Man is the cell of any society. He is the essence of an agency. The living standard of man determines the status of a society. In simple words, man is the litmus test for the health of a society (Booth, 1991, pp. 113-126; Booth, 2002, p. 222).

Barry Buzan has also contributed to introduce the levels (Buzan, 1998, p. 5)[v] of analysis on regional basis. These levels are helpful in understanding the location of the actors, referent objects and dynamics of interaction that operate in the realm of security (Buzan, 1998, pp. 5-6). Barry Buzan opined that a successful securitisation has three components or steps: Existential threats, emergency action, and effects on inter-unit relations by breaking free of rules (Buzan, 1998, p. 26). The existential threat can only be understood in relation to the particular character of the referent object in question (Buzan, 1998, p. 21). A discourse that takes the form of presenting something as an existential threat to a referent object does not by itself create–this is a

securitising move, but the issue is securitised only if and when the audience accepts it as such (Buzan, 1998, p. 25). Theory of Securitisation of Barry Buzan and Ole Waever helps to understand the plant biosecurity.

Figure-1 Integration of TSP & NTSP



In the aftermath of 9/11, the international politics has experienced various changes having serious consequences for the international as well as national security of the states. Many states have been compelled to reconsider and revise their foreign policies particularly pertaining to WMD-Chemical, Biological and Radiological weapons. The anthrax-laden letter's attack of October 2001 was a new phenomenon, which attracted the attention of the strategists, policy-makers and academicians equally (Kalia, 2005, p. 84). Bruce Hoffman pointed out that the changed significance of terrorism in post-9/11, rapid developments in biotechnology and difficulties in policing the proliferation of biological agents heighten the threat from biological terrorism. Biological weapons have the capability to strike psychological terror in masses. This makes biological weapons an ideal tool for terrorists (Hoffman, 1997, pp. 45-53; Lele, 2005, p. 105). The biological weapons are also gaining importance in the post-9/11. In this regard, Michael Barletta stated:

The pathogens market is a new emerging one. These germs can be sold to non-state actors either intentionally or unintentionally. These lethal pathogens are manufactured in hundreds of laboratories and companies around the world. There are set of laws on access to them. However, these laws are varied in nature (Barletta, 2002, p. 61; Chari, 2005, p. 110).

John Eldridge highlighted the looming threat of using bio-weapons by terrorists in the post September 11, 2001 incident. He argues that post-9/11 pathogenic weapons detection has gained tremendous importance and attracted the attention of the world. These weapons can be used in the atmosphere through dispersion. Besides this, these may be used for contamination of water or aerosol dispersal. Keeping in view all these possible dangers, the challenges facing Biological Weapons detection system designers are enormous (Eldridge, 2003, p. 38; Chari, 2005, p. 13).

Plant Biosecurity Governance

The security thinkers have attached the health of plants and crops with security and placed plant biological security under the umbrella of Security studies. Plant Biosecurity governance in simple words is synthesis of both legal documents and institutional mechanism to protect the health of agricultural products (plant) from any disease or their protection from intentional or unintentional use of pests and pathogens. This unintentional use may be due to negligence and non-compliance with the biosafety laws, or natural occurrence due to flood or any other natural calamities. In either case, the primary victim is plant and secondary victims are the animals and human beings. Hence, plant biosecurity is intimately connected with human biosecurity within Non-Traditional security paradigm (Zhang, 2014, p. 2).

The intentional use of pests and pathogens against the agriculture sector of a nation is known as agricultural terrorism (Keremidis, 2013, pp. 17 & 19; EPPO, 2007). Agro-terrorism has remained of profound fascination for both state and non-state actors. History reveals that pests and plants have been employed as weapons against the enemy. In past, agro-terrorism has limited its consequences due to poor transportation system and poor technical know-how. However, in modern times, due to the technological advancement and modern rapid transportation, agro-terrorism have been become a global plant biosecurity issue (Keremidis, 2013, p. 17).[vi]

In Pakistan particular and in South Asia general, plant biological insecurity is admitted as an existential threat that needs to be cured. Hence, in different periods and at various levels, institutions have been established to frame plant protection laws so as to counter agro-terrorism. However, these plant protection legal instruments are not implemented in letter and spirit which have exacerbated the threats of agro-terrorism in Pakistan particular and in the South Asia general. Plant biosecurity governance is earnestly needed to ensure security of individuals by discouraging the agro-terrorism not only in Pakistan but also in the South Asian region.[vii]

The research study is mainly focussed on Khyber Pakhtunkhwa due to its geo-strategic locations and vulnerabilities in terms of on-going international war on terrorism and internal militancy with the support of hidden foreign hands. Khyber Pakhtunkhwa has shared border with Federally Administered Tribal Area (FATA) and Frontier Regions (FRs) — full-fledged tribal area and semi-tribal area respectively. Map-1 gives a clear picture of various parts of KP sharing border with tribal areas of Federally Administered Tribal Areas (FATA) and with semi-tribal areas of Frontier Regions (FRs).

Global Plant Biosecurity Governance

Pests are considered the fundamental tools of agro-terrorism. Live-stock industry is also based on agriculture. In 2003, the Mad-cow disease (bovine spongiform encephalopathy) has severely affected the cattle markets in Canada. Similarly, in 2002 the exotic Newcastle disease incident in USA has caused severe damage to the poultry industry of South California. It is a highly contagious viral disease of domestic poultry, caged and aviary birds and wild birds. It led to the culling of poultry. This caused great financial lose (Gautam, 2005, p. 125). Agricultural terrorism (Agro-terrorism) is one of the aspects of bio-terrorism.

The global security community has made Non-Proliferation of Global Agro-terrorism efforts to ensure the plant biological security. Pests may be used as weapons against plants, animals, and humans. Pests can be used to penetrate in any endangered area where they can play havoc. At global level, legislation has been made to counter the intrusion of pests in any alien locality. International Plant Protection Convention (IPPC), 1997 is the global effort to cope with this issue. IPPC makes obligatory on the signatories to issue phytosanitory certificate to ensure the protection of consignments of plants and their products. Similarly, it also obligates the surveillance of plants, their cultivation, growth, and the areas where these plants are cultivated. Under IPPC, the contracting parties to inspect the importation of plants and their products. Besides this, it also ordains for training and development of staff and of holding research and investigation in the field of plant protection (IPPC, 1997).

Regional Plant Biosecurity Governance

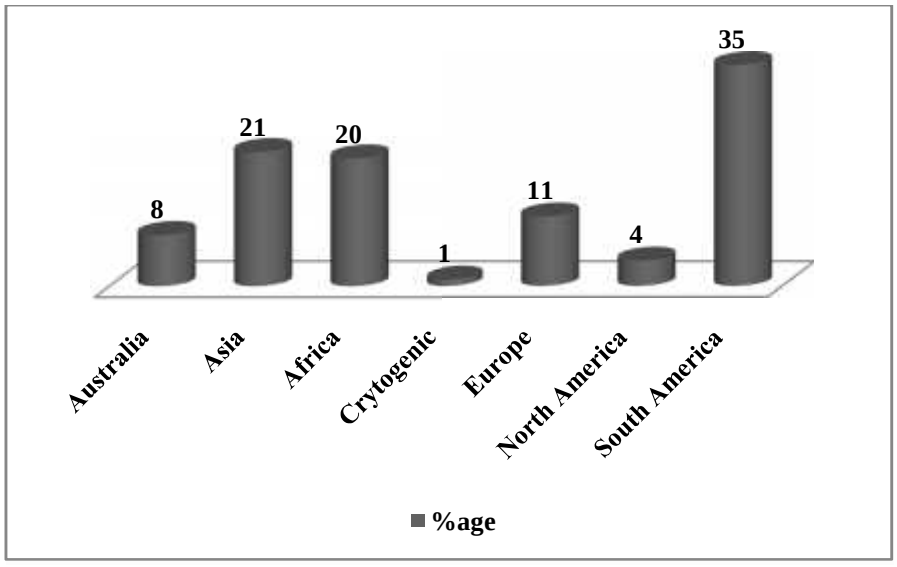
Natural factors in South Asia are playing pivotal role to integrate the seven states, namely Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. The Himalayan Mountain and the seas in the South also contributed an integrated ecosystem (Chapman, 2000, pp. 3-8). In south Asia, the case of

two major countries- Pakistan and India is taken for biosecurity situation in the region.

Article IX of IPPC ordains all the signatory nation states to establish regional plant protection organisations. The basic motive behind this provision is to ensure plant biosecurity of the states in different regions. It is also noteworthy that South Asia is the region of developing countries. Most of the countries in this region are caught in the quagmire of plague, diseases, poverty, floods, cyclones, internal disturbances, and other security issues. In India, plant biosecurity in terms of intrusion of alien pests and their devastative effects on country's agriculture sector is alarmingly felt (Reshi&Khuroo, 2012, p. 305).

According to research study, 1599 alien plant species belonged to 841 genera in 161 families in India. The alien flora thus represents 8.5% of the total Indian vascular flora. India among other countries of the world is also confronted with existential threats of alien pests' invasions (Goyal & Arora). This threat is multiplied of globalization of country's economy with accelerated pace (Wesphal, 2008, 10; Roques, 2009, pp. 63-79), particularly due to high rate of imports (Levine, 2003, pp. 322-26)

Figure-2 Various Regions share in India alien flora



Courtesy: (Reshi&Khuroo, 2012,p. 305)

In the South Asian region, India has felt the threat of outbreak of diseases due to the extra-ordinary growth in genetic engineering and the advent of new

pests. Besides these, the climatic change, bioterrorism and the spread of trans-boundary disease also pose incalculable risks to plants, animals, human beings and environment. To counter such imminent threats the Union Agricultural Minister, SharadPawar tabled a bill in LokSabha, i.e., *"Agriculture Biosecurity Bill, 2013"* on March 11, 2013 (Frontline, April, 5, 2013). It was very comprehensive bill. It urged for the integration of both plant and animal quarantine departments. It also mandated to establish 'the Agriculture Biosecurity Authority of India' to prevent, control, eradicate and manage pests and diseases of both plants and animals so as to ensure agricultural biosecurity (PRS Legislative Research). However, there are reservations about the passage of this Bill that it was passed without consulting the states' governments (The New Indian Express, 2014).

National Plant Biosecurity Governance

The economy in Pakistan is mainly agro-based. However, the dual-use dilemma in technological advancement in the field of biology has created apprehension of intentional by either state or non-state actors or unintentional use of pathogens against plants and crops due to non-compliance with the biological safety laws (Khalil &Shinwari, 2014, p. 1). In Pakistan plant biosecurity governance has two dimensions, from quarantine perspective and from academic perspective.

A. Plant Biosecurity Governance: From Quarantine Laws Perspective

Quarantine laws regulate the import and export of agricultural products between Pakistan and nations to protect the indigenous agriculture sector from any alien pest or plant biological weapon. Plant biosecurity laws in Pakistan have their roots in history. In the pre-independence period of Pakistan, *'Destructive Insects and Pests Act, 1914'* was adopted under Governor General of Pakistan Order No. 04 in 1949 to cope with such insects which posed a threat to plants and crops in the country.

Since then efforts were made to protect plants, crops, horticulture and floriculture from the pathogens, insects and the diseases caused by them. At international level, efforts were made to protect plants from pathogens. The *Plant Protection Convention (PPC), 1951* under the auspices of Food and Agriculture Organisation (FAO) is a living example. To bring in conformity with PPC, the government of Pakistan incorporated necessary amendments in the 'Plant Quarantine Rules' on September 15, 1962. These rules were consolidated in 1966 under the provisions of the '*Destructive Insects and Pests Act', 1967*.[viii]

Later on, some amendments were felt essential to incorporate in the *'Destructive Insects and Pests Act, 1914'* and adopted the *'Plant Quarantine Act, 1976'*. It is worth to note that British inherited *'Destructive Insects and Pests Act, 1914'* was repealed under Section 11 of '*Plant Quarantine Act, 1976*'.[ix]

Plant Quarantine Act 1976 deals with safety aspects of bio-related facilities. Another milestone was the establishment of the Inter-Agency Working Group on Life Sciences at the Ministry of Foreign Affairs (MFA) and the issue of the National Guidelines for Code of Conduct for Life Scientists, which was shared with States Parties at the BTWC meeting in December 2010.

Pakistan Plant Quarantine Act (PPQA), 2006 has been introduced in the light of new revised text of International Plant Protection Convention, 1997. PPQA, 2006 is extendable to all parts of the country. This Act prohibits those items which have biosecurity threats and allows those which are beneficial to society (PPQA, 2006).This Act also provides for punishment for violating it (Articles 6 & 7 of PPQA, 2006). This Act has amended the PPQA, 1976 and repealed '*The Destructive Insects and Pests Act, 1914'*(PPQA, 2006).

Article IV of IPPC, 1997 bounds the all the signatory states to make proper laws in their respective countries in the light of its broader policy guidelines. The Government of Pakistan has made legislation in this regard.Government of Pakistan felt the necessity of legislation to cope with anti-plants pathogens keeping in view the looming pathogenic threat to plants. The Government of Pakistan has made laws to ensure biosecurity of plants.

B. Plant Biosecurity: From Academic Perspective

Biotechnology is a getting saturated among biological sciences in Pakistan. Pakistan is the Party to Cartagena Protocol on Biosafety (CPB) under Convention on Biological Diversity (CBD). National Commission on Biotechnology was established on November 30, 2001 in Pakistan.[x] The Federal Government of Pakistan therefore designed National Biosafety Guidelines in line with the CPB. The Guidelines includes regulating all Genetically Modified Organisms (GMOs), viroids, viruses, cells and organisms, modified or constructed through genetic engineering), derivatives thereof and wastes or by-products of genetic engineering practices (containing viable organisms or otherwise). Enforcement of various clauses of the National Biosafety Guidelines (NBG), 2005 will be administered by the three monitoring implementation bodies, as per legal authority of the Pakistan Environment Protection Act 1997 (NBG, 2005). It is worth to note that PBRs, 2005 are complementary to National Biosafety Guidelines, 2005.

Keeping in view the perverted aspects of it and to utilize this field newly emerged field of biological sciences for the benefits of its citizens, the Federal Government has framed special rules, known as Pakistan Biosafety Rules (PBRs), 2005. These rules are consisted of 27 provisions. It gives a crystal clear account of regulation of biotechnology, establishment of institutional mechanism for this purpose, prohibition of anti-environmental living modified organisms (LMOs), licensing for conducting of research on LMOsfor the welfare of citizens, etc.[xi] These rules regulate:

a. The manufacture, import, export, storage of LMOs and gene technological products for research, whether conducted in laboratories of teaching, research and development institute in public and private sector;
b. The work involved laboratory work, field trial and commercial release of developed GMOs—plant, animals and microorganisms); &
c. The import, export, sale and purchase of GMOs for commercial purposes.

Biosafety Rules, 2005 provide for the establishment of proper institutional monitoring mechanism for the implementation of the National Biosafety Guidelines, 2005. This document provides for the following three tiers institutional set up.

i. National Biosafety Committee (NBC)

The National Biosafety Committee is established at national level.[xii]The National Biosafety Committee shall be responsible to deals all issues related with living modified organisms (LMOs), to determine the nature in importation, exportation, trading on the nature of LMOs with respect to its intensity of risks to health security of the people and environment, to coordinate with the foreign biosafety committees and other national and provincial agencies to keep an eye on trading of LMOs, to ensure the execution of biosafety rules in the country, etc.[xiii]

Ii. Technical Advisory Committee (TAC):

Technical Advisory Committee is consisted of twenty members.[xiv]It has the function to review the recommendations of the NBC regarding LMOs, to review research in genetic engineering, to ensure the implementation of the rules approved by the NBC, etc.[xv]

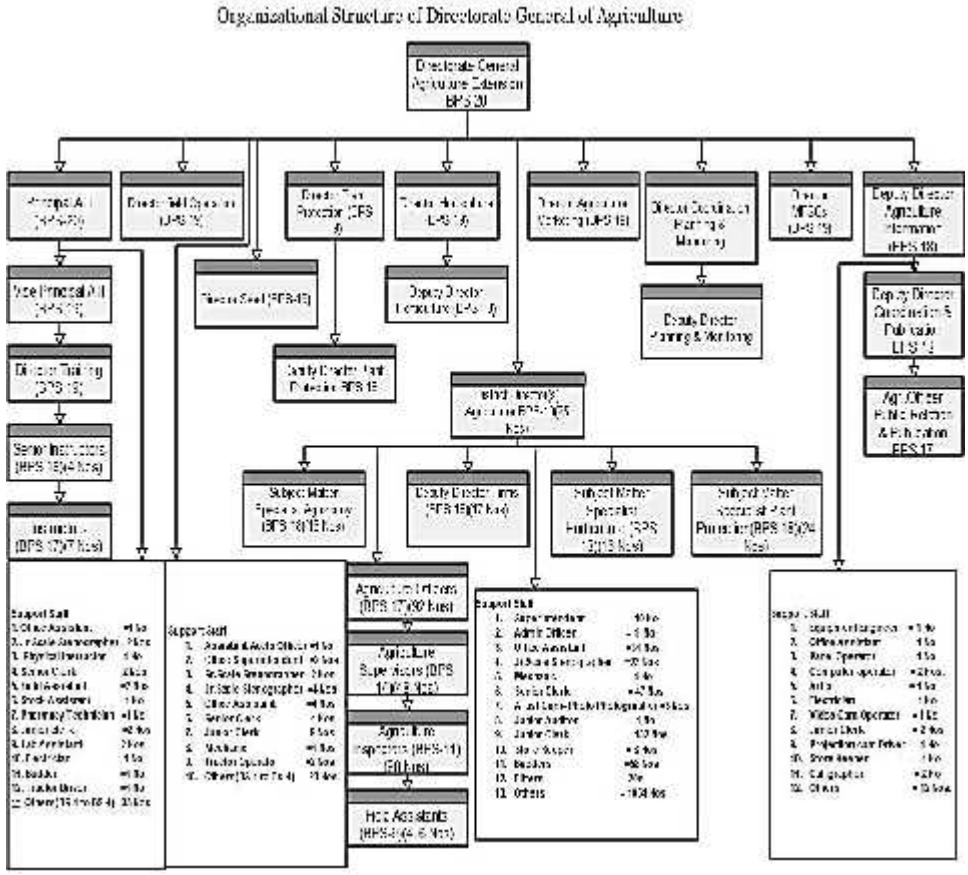
iii. Institutional Biosafety Committee (IBC)

It shall be consisted of Head of the institute, subject expert, social scientist, representative of the civil society, and biosafety officer.[xvi] It will be responsible

to coordinate with NBC and TAC in the bio-risk management, to execute biosafety rules, to evaluate various biotechnological projects, to monitor the various laboratories, etc.[xvii]

At provincial level, there is an integrated organizational structure in the shape of Directorate General of Agriculture working under the provincial ministry of agriculture. It integrates Agriculture Training Institute Peshawar, Field Operation wing, Plant Protection wing, horticulture wing, agro-marketing wing, and planning and monitoring wing (See Figure-3). Each wing/section performs particular assigned functions. However, Plant protection department is responsible to implant plant quarantine laws across the provinces.

Figure-3 Integrated Organisation Structure of Plant Protection



Courtesy: Khyber Pakhtunkhwa Government (http://khyberpakhtunkhwa.gov.pk/khyberpk/page.php?pageID=486&deptID=236)

Ramification of Plant Biosecurity Paradox: Case Study of Sugar Cane Borer:

Pakistan has agricultural economic base. Sugarcane is one of the most important cash crops of the country. Sugarcane crops production has placed the fifth largest cane producing country in the world. However, the cane production in the country is below expectation due to several factors like poor management, shortage of water, poor quality of seeds, weeds, etc. In addition to these, the alien insect pests also play their role to damage sugar crops in the country. Study shows that insects affect about 20 to 40 per cent production which causes economic losses to the sugar cane growers. Among other sugar cane pests, the sugar borer affects the crop more. These borers lay eggs underside of the leaves of the sugar cane. The incubation period is 36 to 38 hours. Once a larva comes out of the eggs then starts to use the tender part of the plant for its feeding. Then it enters into the sugar stem. It damages the stem of the crop and turns it unable for consumption and milling (Dawn, June 11, 2007).

The study also declares insecticides as not of much significant tool to control the sugar borer larva. In addition to this, pesticides multiply other issues like resurgence of pests, outbreak of secondary pests, environmental pollution, etc. The study recommends the cultural control and biological control as the useful means to overcome such problems and also to control pest (Nadeem and Hamed, 2011; Huffaker, 1980). Parasitoids and predators are considered as significant biological tools to control these borers. *Trichogrammachilonis* (Figure-4) among parasitoids (insects whose larvae live as parasites which eventually kill their hosts) is a polyphagous egg parasitoid of *lepidopterous* pests of crops. The scientific study in life sciences found it as an effective biological control agent against sugarcane borers in provinces of Punjab and Sindh in Pakistan (Hashmi and Rahman, 1985; Nadeem and Hamed, 2011).

Figure-4Trichogrammachilonis[xviii]

Courtesy: National Bureau of Agricultural Insect Resources (NBAIR)

Biological control strategy is adopted to control this pest. It is controlled with help of another insect that is *Trichogramma Chilonis*. However, the intrusion of the sugar cane borer gives birth to several questions like whether this insect is indigenous or alien? In the latter case, is not the reflection of the poor implementation of the plant biosecurity or plant quarantine laws? To ascertain the answers of such questions, some experts on biotechnology and entomology were interviewed.

Plant Biosecurity Issues

Research study reveals the various plant biosecurity issues and challenges. These range from individual to international issues. Following are some of the outstanding issues.

Firstly, the lack of proper trained staff hinders the performance of the plant protection department. One of the major structural issues is the lack of proper trained staff in the quarantine department. Dr. Ijaz (personal communication, February 10, 2014) stated:[xix]

There is lack of proper trained staff in Quarantine Department. In addition to this, Quarantine Department is also faced with pecuniary hardships. There is also lack of skill. The lack of commitment on the part of government is also seemed.

Second, the lack of implementation of Plant Quarantine Act also hinders the plant biosecurity in the country and in South Asian region. There are various Acts to protect plants against any disease and wild pests. This will ultimately

leads to the protection of humans and animals against any disease. In the province there is an institutional set up in the form of Plant Protection Department. However, the performance of this department is unsatisfactory. The inefficient delivery of functions on its part results in the poor implementation of the Quarantine Acts in Pakistan and Khyber Pakhtunkhwa Province particular. Prof. Dr. Jahan Bakht (personal communication, February 10, 2014) adds:[xx]

In Pakistan, we have Plant Quarantine Acts and Animal Quarantine Acts. However, these Acts are not implemented in their true spirit. There is free transportation of goods at airports. The custom officials are the facilitators in this transportation. This is not a case the developed countries. This is very alarming trend in our country.

Third, the research study shows the lack of general public unawareness as one of the main obstacles in the way of plant biosecurity in the country. The people in academic institutions including students, who are directly linked with the life sciences, are unfamiliar with plant biosecurity concept as courses relevant with bioterrorism, biosafety and biosecurity have not yet offered in their academic curriculum. In this regard, Prof. Hashim Khan (personal communication, February 11, 2013) stated:[xxi]

Bio-weapons and bioterrorism are old concepts in the bio-literature. However, biosecurity is a new addition in this literature. In our curriculum, courses regarding bio-security and biosafety are not yet offered. The students are not acquainted with the concepts of biosecurity. Curriculum needs be revised so as to keep abreast of bio-students about these concepts.

Fourth, absence of proper effective monitoring mechanism is another biosecurity challenge in the province. Due to absence of it, plant protection legal instruments are not being implemented in KP particularly and in Pakistan generally which is a severe biosecurity threats to its residents. Similarly, this is also a threat to residents of other nations in South Asia.

Fifth, the people of KP are at constant risk from Afghanistan—the nursery of non-state actors— with respect to plant bio-insecurity due to continuing fruit and vegetables transportation without proper quarantining these items. Director, Plant Protection Department, Mr. QaziFayaz (personal communication, August 20, 2013) also states:[xxii]

The people of the province of Khyber Pakhtunkhwa have plant bio-insecurity threats from our neighbour country in West, i.e. Afghanistan. Afghanistan is

the hub of non-state actors. The non-state actors in Afghanistan are active beyond doubt.

Sixth, the lack of political will is another challenge to ensure biosecurity in the country and KP. The political leadership is not mainly concerned with this aspect of human security.

Seventh, the heterogeneous political and administrative divisions of the country also hamper the execution of existing plant biosecurity laws. In addition, it also impedes the formulation of such laws. Settled areas are under the provincial government jurisdiction of Khyber Pakhtunkhwa. Contrary, Federally Administered Tribal Areas are directly under control of the central government of Pakistan and provincial government has nothing to do their business. The Frontier Regions are semi-tribal areas. These regions fall under the jurisdiction of both provincial government of KP and central government of Pakistan. Due to prevailing anarchical situation, the FATA are not easily accessible for the plant quarantine officials. In various parts of FATA, like Khyber Agency, North Waziristan Agency military operations are launched against the militants (Khan, 211/12).

Eight, Global War on Terror (GWoT) has implications on plant biosecurity in the province of KP and in the country general. The GWoT has severely paralysed every walk of life in the province. The general security situation in the province is miserable. GWoT has diverted the attention of the policy makers to traditional security threats instead of mainly focusing on non-traditional security threats like biosecurity due to imminent threats to the lives of this province (Khan, 2014).

Regional Challenges

The South Asian Association for Regional Cooperation (SAARC) member states have no unanimous adopted Plant/Agriculture biosecurity laws to regulate the transportation of agricultural products among them. The deadly role of SAARC due to prevailing non-cooperation among the member states and Indian belligerent policies in the region has led to focus on the human security issues and biosecurity issues in the region.

Recommendations

To ensure maximum plant biosecurity in country and in the province of Khyber-Pakhtunkhwa and FATA, there is need of the hour to take some concrete and sincere steps. Followings are some suggestions which may prove helpful in this regard.

First, the strengthening of the plant protection departments should be ensured. The Plant Quarantine department should be equipped with the modern technology to diagnose the plant diseases caused by any alien pest. For this, financial resources should be provided to plant protection department to make it on strong footing.Second, diagnosing the plant disease will lessen the chances of biosecurity risks. So the disease must be diagnosed in time. For this, well equipped laboratories should be established and the existing laboratories should be modernised.

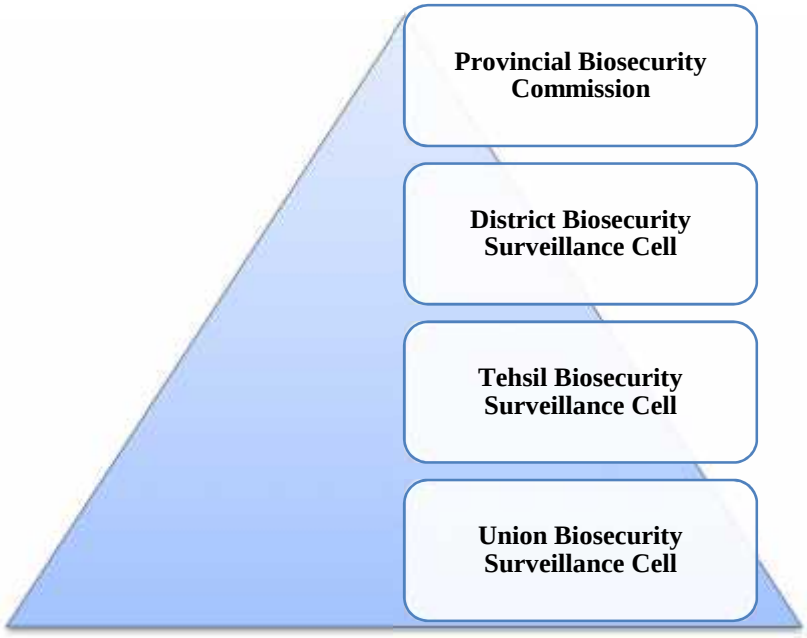
Third, to counter the illegal transportation of plant products like fruits and vegetables among neighbour countries of Pakistan, it is required to establish border plant biosecurity check points. Fourth, the custom officials should be made responsible to coordinate with the plant protection department officials to contain the threats of disease to be caused by the alien pests in the transported goods from the neighbour countries.

Fifth, proper monitoring mechanism to evaluate the performance of the plant quarantine department needs to be introduced. The officials should be made responsible to submit their progress reports on monthly basis. In case of poor performance, stringent disciplinary action needs to be taken against incompetent and corrupt officials. Sixth, proper training to the officials of the plant protection department should be introduced. There should be refreshing courses for the in-service officials to keep them update about the modern plant quarantine techniques.

Seventh, the provincial government should launch public awareness programme to educate the general people, traders engaged in food transportation business and department employees respectively.

Lastly, biosecurity is an innovative security paradigm in Pakistan. Many of the policy makers and general public are still unaware about it. It is still a neglected security sector in Pakistan. Today, Biosecurity is not only the domain of the health department alone, therefore an integrated legal and institutional approach is needed to cope up with dormant and hidden biosecurity threats in KP particular and in the country in general (Jaspal, 2015, pp. 25-26). The government at all levels needs to take sincere and immediate steps to counter the looming biosecurity threats. Otherwise a time will come when the situation goes out of the control. Instead of blessing, the biology fields will become a curse not only for local population but also for regional and international populace. Precisely, the Biosecurity needs dual-approach solution. One is an integrated institutional approach for biosecurity policy formulation mechanism and the second is biosecurity surveillance and implementation mechanism (Figure-5).

Figure-5 Hierarchical Biosecurity Policy Formulation & Implementation Institutional Mechanism

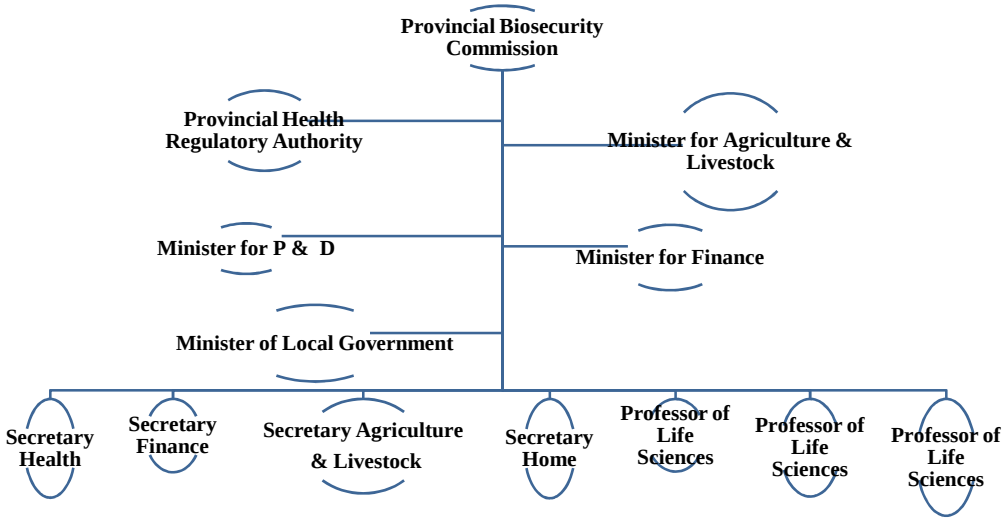


Biosafety Rules, 2005 provide for establishment of National Biosafety Committee, National Technical Advisory Committee and Institutional Biosafety committee. However, the 18th Constitutional Amendment in the 1973 Constitution of Pakistan has transferred some subjects/items from Federal Government to the Federating Units including both health and higher education. Now the replica of national biosafety commission should also be established at provincial and district levels to ensure implementation of the existing laws and to formulate new ones according to changing circumstances.

The provincial government needs to establish a statutory body in the shape of Provincial Biosecurity Commission (PBC) to formulate comprehensive biosecurity policy in all its dimensions. The KP health minister, Chairperson of the KP Health Regulatory Authority, Minister for Agriculture & Livestock, Minister for Planning & Development (P &D), Minister for Finance, Secretary

health department, Secretary finance department, Secretary agriculture & Livestock, Secretary Home department and three senior most professors of life sciences having extensive research experience in their respective fields should constitute its composition. These professors should be picked from different universities of the province. They should also belong to different disciplines in life sciences particularly from biotechnology and genetic engineering. The Chief Minister (Chief Executive) of the province or his nominee should preside over the meetings of the Provincial Biosecurity Commission (PBC) (Figure-6).

Figure-6 Flow Chart of Provincial Biosecurity Commission



This institutional approach would constructively contribute to design a comprehensive policy to counter biosecurity threats either stemming out from diease, poor sanitation and drainage system, or from medical and pharmaceutical mafias, or bioterrorist attacks or natural calamities. It will be a coordinating body composed of both political and bureaucraic leadership who are directly and indirectly linked with to counter such threats.[xxiii]

Three-tiered biosecurity integrated institutional surveilannce (BIIS) mechanism is required to keep an eye on the non-state actors and on other suspecious elements in the society so as to ensure biosecurity in all its perspectives. The

provincial government needs to estalish District Biosecurity Surveillance Cell (DBSC) at district level, tehsil/town Biosecurity Surveillance Cell (TBSC) at Tehsil/Town level and Union Biosecurity Surveillance Cell at union or neighbourhood council level under the jurisdiction of district health department.

The DBSC should be comprised on a representative from district department, a representative from district police department, and district nazim (mayor) and district adminstrator (deputy commissioner) of the district adminstration. The TBSC should be copmosed of a representative from Tehsil/Town health department, a representative from tehsil police department, and tehsil/town nazim (mayor) and tehsil adminstrator (assistant commissioner) of the tehsil/town adminstration. The UBSC should be copmosed of a representative from town health department, a representative from local police department, and union nazim (mayor). Each of these tiers should have the responsibility to implement the global, national and provincial biosafety, biosecurity, health security policies within its terrirtorial and statutory jurisdiction.[xxiv]

It is only possible when local government institutions are allowed to flourish. The national political leadership and prevailing dynastic politics does not allow the local government institutions to grow on strong footings due to its fear to lose political monopoly by emergence of new political leadership from grass roots level. The lack of local government institutions and indifferent attitude of the national leadership towards such institutions have multiplied societal problems rather to address them at grass-roots levels (Khan, 2010).

Importantly, some structural reforms are needed in the colonial inherited political system of Pakistan so as to make it up to the inspirations of the founding fathers and people of Pakistan. The uneven geographical distribution with absolutely heterogeneous legal, administrative and judicial system is one of the main impediments in the way of formulation and execution of a national security policy. The judiciary in Pakistan is happened to be helpless in dispensing justice pertaining to the tribal areas (The Express Tribune, March 18, 2014).[xxv]

In addition to this, the member states of South Asian Association for Regional Cooperation need to take some concrete steps to design ‘South Asian Biosecurity Mechanism’ including plant biosecurity mechanism so as to ensure the health of plants in their respective countries and also food security in the region. These states should also comply with the IPPC at national levels.

Conclusion

The biosecurity governance paradox in Pakistan has serious repercussions. The people of Pakistan are exposed to biosecurity threats. Plant biosecurity governance along with human and animal biosecurity is a serious threat to health of plants, animal, and human beings alike. The poor implementation of existing laws, unsatisfactory role plant quarantine department, malpractices, financial constraints, general ignorance about the significance of plant biosecurity, the prevalence of multifarious sub-political systems, internal insurgencies, and the intense wave of Global War on Terrorism, anarchical situation in Afghanistan, and the general weak plant biosecurity regime in South Asia have severely jeopardised plant biosecurity in Pakistan.

Notes

[i]The prominent advocates of liberalism are Karl W. Deutsch, Michael Doyle, Francis Fukuyama, Ernst B. Hass, Stanley Hoffmann, Robert O. Keohane and Richard Rosecrane.

[ii] Alexander Wendt, Friedrich Kratochwil and Onuf are famous constructivist thinkers.

[iii] Alexander Wedt explains the term identity as 'a comparatively firmly fixed, role-oriented understandings and expectations about self'.

[iv] According to one study, 100 kilograms of aerosolized anthrax is sufficient to cause 3 million deaths in a densely populated area.

[v] Levels mean objects for analysis that are defined by a range of spatial scales, from small to large. These are locations where both outcomes and sources of explanation can be located.

[vi] The threat groups and perpetrators associated with bio- and agro-terrorism may be categorised into -apocalyptic sects, lone wolves, political groups, and religious groups. In modern times, four agro-terrorism cases reported: (1) in 1952, Mau Mau poisoned cattle in Kenya by using a plant toxin from the African milk bush plant; (2) in 1985, the USDA claimed that Mexican contract workers were involved in deliberately spreading screwworm (Cochliomyiahominivorax) among livestock; (3) in 2000, Palestinian media reported that Israeli settlers released sewer water into Palestinian agricultural fields; and (4) in 2011, a person was sentenced to prison after threatening US and UK livestock with the deliberate spread of foot-and-mouth disease virus. All 4 cases can be assigned to political groups.

[vii] Interviews were held to ascertain the biological experts' opinion on plant biological security in Khyber Pakhtunkhwa, Pakistan generally and South Asia.

[viii] This Act was published in 'Government Gazette of Pakistan Extraordinary *vide* SRO 129 (K)/ 67, dated January 2, 1967.

[ix] Details is given in '*Plant Quarantine Rules, 1976'*, Ministry of Food, Agriculture and Co-Operatives, Department of Plant Protection, Government of Pakistan, p. 5.

[x] The fundamental objectives of this Commission are: to strengthening research facilities in provinces, to finance young researchers for projects of high priority, to establish the centre for Bioinformatics, to strengthen Government- Private sector collaboration, publications, T.V. and Radio Programmes, and to encourage research which increases export.

[xi] The Federal Government of Pakistan framed these rules under Section 31 of the *Pakistan Environmental Protection Act, 1997* dated April 21, 2005.

[xii] It is composed of seventeen members. Secretary of ministry of Climate Change and Chairman, Pakistan Agriculture Research Council will act as Chairman and vice-chairman of the committee respectively. Member (Science) of Pakistan Atomic Energy Commission, representative from each province of the country, representative from Environmental Protection Agency of Azad Jammu & Kashmir, representative from Forest Wildlife and Environment Department of GilgitBaltistan Secretariat, representative from Ministry of National Food Security & Research, representative from Ministry of National Health Services, Regulation and Coordination, representative from Higher Education Commission, representative from Ministry of Science and Technology, representative from Ministry of Commerce & Textile Industry, representative from Federal Board of Revenue, representative from Ministry of Industries & Production, and Director General of Pakistan Environmental Protection Agency shall be its members. The tenure of the committee is three years.

[xiii] Details of its establishment, composition and functions is given under Sections 4 & 5 of the *PBRs, 2005*

[xiv] Director General of Pakistan Environmental Protection Agency, Director of National Institute of Bio Technology and Genetic Engineering (Faisalabad), Executive Director of Pakistan Medical Research Council (PMRC) of Islamabad, Member (Science) of Pakistan Council of Industrial and Scientific Research (PCSIR) of Islamabad, Executive Director of National Institute of Health (NIH) of Islamabad, Director of Centre for Molecular Genetics of University of Karachi, Representative of Centre for Applied and Molecular Biology of Lahore, Relevant Technical Expert (Plant Sciences) from Pakistan Agriculture Research Council (PARC) of Islamabad, Relevant Technical Expert (Animal Sciences) from Pakistan Agriculture Research Council (PARC) of Islamabad, Technical Expert of Environmental Protection Agency of each province including Azad Jammu &Kasmir and Gilgit-Baltistan, Representative of Intellectual Property Organization (IPO), Representative of IUCN – The World Conservation Union Pakistan, Expert from Sustainable Development Policy Institute (SDPI) of Islamabad, Expert Action Aid Pakistan, Representative of Ministry of Textile Industries, Islamabad Co-opt Member, Representative of Federal Seed Certification & Registration Department (FSC & RD), Islamabad Co-opt Member, and Director of Pakistan Environmental Protection Agency constitute its composition.

[xv] See for details of its establishment, composition and functions under Sections 6 & 7 of the *PBRs, 2005*

[xvi] See for details of its establishment, composition and functions under Section 10 of the *PBRs, 2005*

[xvii] See for details of its establishment, composition and functions under Sections 8 & 9 of the *PBRs, 2005*

[xviii] Details about TrichogrammaChilonis can be accessed on http://www.nbair.res.in/Featured_insects/Trichogrammatids.php (Retrieved on July 16, 2015).

[xix] Dr. Ijaz Khan is an Assistant Professor, Institute of Biotechnology & Genetic Engineering, NWFP Agricultural University Peshawar

[xx] Prof. Dr.JahanBakhat was the Director of Institute of Biotechnology & Genetic Engineering, NWFP Agricultural University Peshawar

[xxi] Professor Hashim Khan is an Associate Professor, Department of Botany, Government Post-Graduate College Bannu, Khyber-Pakhtunkhwa

[xxii]Mr.QaziFayaz is the Director, Plant Protection Department, Director General Agriculture (Extension), Peshawar, Khyber-Pakhtunkhwa

[xxiii]Minister for local government, minister for P & D, minister for finance, secretary finance, and secretary home will be facilitaors to help to design planning and its implementation. Political leadership comes in and goes out of power. However, the latter is permanent. It can therefore play the role of a bridge between two political regimes.

[xxiv]It should have the responsibility to submit at least quarterly report to the provincial biosecurity commission. There is no need to hire new staff. These cells are the outcome of coordination of various departments under the district health department to ensure pathogenic-threats free enviornment for the peole at the grass-roots levels. This mechanism proves for dual coordination, one is verticle and other is horizontal among different organisations or departments. In this connection the local government representatives can play crucial role.

[xxv]Article 247 of the Constitution of Pakistan has made the Supreme Court and high courts toothless to exercise jurisdiction in the tribal areas. The country is divided into Federally

Administered Tribal Areas (FATA), Frontier Regions (FRs) semi-tribal areas, Provincial Administered Tribal Areas (PATA) and settled areas.

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