

CONCEPTUAL DELIMITATIONS IN THE FIELD OF BIOSECURITY

Mihai VELICOF

“Carol I” National Defence University, Bucharest, Romania
velicofmihai23@yahoo.com

Abstract: Biosecurity is a term who was brought more into our attention after the events of September 11, 2001 who have been followed by the most famous bioterrorist attack with the anthrax letters. Defining biosecurity is not as easy how it looks at first side because this term it has a lot of interpretations according to various disciplines where it is used. At the beginning biosecurity was introduced as a set of measures with the purpose to reduce the risk of transmission of the infectious diseases in living modified organism, quarantined pests and infectious diseases in livestock and crops. Nowadays the term includes also the biological threats to environment, industries and to people and brings into our attention terms like bioterrorism, bioattack, bioweapons, biodefense, biosafety, biohazard, biorisk, biocontainment and biosurety. This article has one primary objective and that is to assess the roots and etymology of the term biosecurity by presenting a short historical perspective which will lead to a better delimitation of the concept, and to define some key concepts related to this area. The result of this conceptual delimitation of the biosecurity is to bring into attention the importance of this area which before COVID- 19 events wasn't took into consideration at the level it should be.

Keywords: historical, biosecurity, bioterrorism, attack.

1. Introduction.

Understanding and controlling of agricultural disease and pests, animal and human diseases was, it is, and it will be a big concern of our society because of the importance of the effects and results from comprehensions of this areas. The control agricultural pests and the disease are very important in production of food and related products, we must understand the devastating impact of pests on the environment and the way these can be used against human lives. For preventing the effect on human lives, a set of national and international regulation appeared in this area under a common umbrella and is being called biological security or biosecurity [1]. The concept biosecurity has many meanings, this depends of the field it is

being used. In defining biosecurity is very important to identify the type of the biological agent used and who is using it. The term is perceived frequently as “a new, more coordinated approach, generally led by a particular governmental authority or network of authorities, to understand and manage natural and human-caused threats to a range of biological resources” [2].

2. A short history of events where was need for biosecurity measures.

Along history the biosecurity measures have been taken in order to decrees or to stop the effects of the biological agents used in different area such as in armed confrontations, terrorism, laboratories or as a natural mutation of the environment. Even though the term of biosecurity wasn't

known, measures for preventing at a small or bigger scale were taken since antiquities when biological weapons were used in military confrontations. The impact of biological weapons and contagious disease was recognized since early 14th century BC, some examples of this biological event are presented in Table 1.

If in the antiquities, Middle Age and in Colonial Period the use of biological agents was used only after an empiric analyse of the natural events and their effects, in the modern area we can talk about a more

rational and systematic process in analysing, controlling and identifying these natural events which gave the opportunity to the scientist to discover and develop new pathogens who sometimes have been putted human lives in danger [4].

In the modern area we can talk also about some measures of biosecurity which have been taken as an action of limiting the effects of the biological agents in natural outbreaks, accidental events or terrorist events.

Table 1 Biological events during antiquities, Middle Age and in Colonial Period [3].

Date of the event	Description of the event
14 th century BC	The Hittites army send infected rams with tularaemia to their enemies.
4 th century BC	Scythian archers used in fight infected arrows by dipping the tips into decomposing bodies.
1155	Barbarossa used human bodies to poison the water wells
1346	Mongols throwed bodies infected with plague s over the walls of the city of Caffa in Crimea.
1422	Lithuanian army used the same tactic as the Mongols in the town of Carolstein in Bohemia.
1495	Spanish contaminated the wine with leprosy and sold it to the French foes.
1763	Distribution of blankets contaminated with smallpox by British officers to Native Americans.
1863	During the American Civil War, Confederates sold clothes contaminated with yellow fever and smallpox to Union troops.

One of the natural outbreaks was the West Nile Virus in the United States in 1999. In charge of the investigation was Centre for Disease Control and Prevention (CDC). The response for this crisis was a complex one which involved all the state institutions who took some measures such as epidemiologic investigations, disease surveillance, implementation of some control measures for reducing the spread of the virus and public outreach [5]. Another example of natural outbreak was in Kosovo in 2000 and the biosecurity measure to prevent the spreading of the virus were similar with the ones in United States and they also implemented after this a surveillance system for controlling the future spreads [6]. The epidemic in Mexico

A(H1N1) influenza in 2009 was one of the biggest natural outbreaks and included as biosecurity measures six broad dimensions for fighting with the epidemic: risk communication, health promotion, healthcare, epidemiologic surveillance, strategic stockpile and last research and development [7]. The last and the most famous outbreak is the one we are living these days Covid-19, for this one all the humanity took measure to prevent the spread such as screening, monitoring and isolation and measures for treatment [8], but the big question is “Way are we not prepared for this?”, we have the experience of the previous outbreaks but still most of the countries didn’t had a plan for the biological security of the country.

Need to know got to technologic progress, but also with this progress come some human mistakes in laboratory's and some bad intentioned people such as the terrorists tried and succeed to use this development to

achieve their purpose. Some of the most representative accidental releases of biological agents and use of them by terrorist are presented in Table 2.

Table 2. Accidental releases and biological attacks [9]

Date of the event	Description of the event
Accidental releases	
April and May 1979	The biggest outbreak of human inhalation with anthrax in Sverdlovsk the ex-Soviet Union, now is Ekaterinburg, Russia.
July 30 1971	A smallpox outbreak in Aralask.
Biological attacks	
September 1984	The Rajneeshee cult intentionally contaminated salad bars in Oregano.
October 2001	Anthrax letters attack in USA

One of the famous attacks was the one after the World Trade Center with the anthrax letter, this attack was the one who brought into most of the country's attention the need of biosecurity measures and how this could be improved. The letter attack was the first intentional release in USA and the investigation of this attack was conducted by Federal Bureau of Investigations on a 7 years period [10].

3. Defining terminology of biosecurity and affiliated concepts.

In the last century this term was implemented at an international level with the main activity to control the impact of the biological hazards to human health. The term biosecurity is a relatively a new one and it has many definitions, but first was used in 1990s in agriculture community affiliated with controlling disease and pests [11].Gregory D. Koblentz when is defining biosecurity is talking about "four faces of biosecurity", every one of those is related to a different field such as [12]:

- In agriculture biosecurity is define as a measure who is associated with managing the risks in plant and animalhealth, food safety associated with human health and environmental risks.
- In security, biosecurity is referring strictly as a measure for preventing the deliberate use of dangerous pathogens.

- In environment, biosecurity refers to the protection of environment against some invasive species.

- In laboratories and research, biosecurity refersto accidental releases of infections or organisms of laboratory workers.

A more comprehensive definition of biosecurity was provided by the National Academies of Science and defines the therm as"security against the inadvertent, inappropriate, or intentional malicious or malevolent use of potentially dangerous biological agents or biotechnology, including the development, production, stockpiling, or use of biological weapons as well as outbreaks of newly emergent and epidemic disease" [13].

The term biosecurity is bringing into our attention some terms related to different areas such as bioterrorism, bioattack, bioweapons, biodefense, biosafety, biohazard, biorisk, biocontainment and biosurety.

- Bioterrorism can be simply defined as "the threat or use of biological agents by individual or groups motivated by political, religious, ecological, or other ideological objectives" [14].

- Bio attack, the meaning of this term is similar with bioterrorism, it involves de deliberate use of a biological agent in intentioned attack.

- Bioweapons are those weapons which incorporates the biological agent.

- Biodefense refers to the use of medical measures to protect humans against bioterrorism [15].
- Biosafety is a very complex term and it can be defined a set of practices and principles which dictate the handling and containment of potentially harmful biological agents in order to prevent infections in laboratory's and public [16].
- Biohazard or biological hazard it refers to the biological substances who can threaten the life of humans and living organism [17].
- Biorisk is defined by World Health Organization as the probability that an accidental infection or unauthorized access, theft, loss, misuse, diversion or intentional release, possibly leading to harm, will happen [18].
- Biocontainment represents the measures that can be taken in order to prevent potential release into environment of the infectious organism or toxins.
- Biosurety is a term that become more used after September 11, 2001 events with the anthrax letters. This term describes the

operations who are held in laboratories from the perspective of operating environment and includes physical security, agent accountability, biosafety and personnel responsibility.

3. Conclusions

The technological progress is evolving permanently, also with this one there are some challenges in different areas of responsibility. One of this area is the security which involves the biosecurity and the need of biosecurity because the risks involving the biological threats are also growing. These risks can be controlled only if the states or the international community are taking notice of the danger pose by biological threats and are coworking to implement a set of measures in order to surpass the threat.

The concept of biosecurity will continue to evolve as the society is evolving and this is bringing every day new changes and new opportunities for analysis and research.

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