GENETIC MODIFIED ORGANISMS (GMOS) FROM THE PERSPECTIVE OF SCIENCE AND MAQASID SHARI‘AH

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ABSTRACT

The development of science and technology in 21st century as well as biotechnology in foods production would be a concern towards Muslims due to uncertainty halal (pure and permissible) and haram (impure and unlawful) status. The objectives of this research to study the characteristics of genetic modified (GM) products and its usefulness from the perspective of science while the Maqasid Shari‘ah of GM described from the perspective of Islam. This research was conducted using a descriptive, comparative and content analysis of the fiqh (maqasid al-shari‘ah) and science (biotechnology) to meet Shari‘ah law. Biotechnology is the exploitation of biological process through genetic manipulation or genetic engineering of either microorganisms, plants or animals. This organism is recognized as genetic modified organisms (GMOs) or genetic modified food (GMF) or transgenic microorganisms, plant and animal. Biotechnology involves in food production is exposing Muslims consumers to several issues such as ingredients and food additives in food, and the raw products which comes from the GMOs. Any food
products produced through science and biotechnology, such as GMOs, it must meet the criteria set by al-Qur’an and Sunnah as well as the maqasid (objectives of) shari’ah. The food products of GMOs have achieved halalan tayyiban (lawful and good) status. Besides the GM food is Halal and come from Halal source, in conjunction with that, the foods must be not in the grey area (shubhah), safe, nutritious and clean.

**Key words:** Biotechnology; Maqasid al-Shari’ah; Genetic Modified Organisms (GMOs); halalan tayyiban; food products

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## 1. INTRODUCTION

Biotechnology is the combination of two terms, biology and technology which means the process of using cells or living organisms as the main material to produce a new product (Mohd Izhar Ariff 2013). History has shown that biotechnology was utilized by previous civilizations during the time of Prophet Muhammad (PBUH), such as in producing alcohol, vinegar, bread, cheese, yogurt, ingredients and food additives using blood plasm, gelatin, tran glutam nase (TGase) and others as part of classical or traditional biotechnology processes (Fari & Kralovanszky 2006; Mohd Izhar Ariff et al. 2017).

In modern era, biotechnology is refers to the combination of various scientific techniques used to produce certain characteristics in plants, animals or microorganisms through genetic manipulation. Genetic manipulations of microorganisms such as bacteria and yeast are offering valuable products of antibiotics, hormones, insulin and others. Genetically modified organisms (GMOs) are organisms which their deoxyribonucleic acid (DNA) was genetically engineered resulting the desired DNA fragments are united with other DNA fragments, the desired genes are phenotypically highlighted. Under Convention on Biological Diversity (CBD), biotechnology is defined as any technology application that uses biological systems, living organisms or derivatives thereof, to make or modify products or processes for specific use. This definition is adopted by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) (Macer 2003).

World population is currently growing at at a rate of 1.09% per year which is estimated at 83 millions people per year in year 2018 (World Population Clock 2018). Thus, the foods need and shelter are parallelly increasing as well as the increasing of human population. Food demanding due to increasing human population leading to high food consumption. Biotechnology is may offer better solution to increase crop and animal productivity. Among the benefits of transgenic animals or GMOs are generally increasing growth rate and productivity of animals in terms of milk and meat, improving resistance to illness, increasing muscle weight and reducing fat, improving nutritional quality of milk, reducing the impact of phosphate contamination in environment and improve fur quality (Uzogara 2000; Sahilah 2018). While, transgenic plant would increase productivity, nutrient quality, resistance to herbicide, delay the ripening fruit process of and increase plant disease resistance to disease and parasite. Thus, both transgenic animal and plant would increase animal meat and foods supply for human consumption (Sahilah 2018).
Biotechnology priority goals are sustaining food productivity, however there are various religious issues in biotechnology shall be taken into account according to Shariah law as if GMOs have used impenissible rat, porcine and other restricted animal gene according to Shariah law. Previous research has shown that consumers were highly sceptical towards genetic modification in food production (Nur Aziera et al. 2009). Efforts to biotechnology must be thoroughly examined in every aspect in securing the Muslim consumers from Allah’s wrath. Allah says in the Holy Qur’an in Surah al-Ma’idah, verse 4 which means as follows: “They ask you, [O Muhammad], what has been made lawful for them. Say, “Lawful for you are [all] good foods”. This verse clearly shows the importance of in-depth study to be carried out for all food products, whether they are based on modern biotechnology or not.

Food and drink which are good (halalan tayyiban) is a compulsory in Islam (Mohd Izhar Ariff et al. 2017). Any Islamically permissible or halal food products cannot be lawful merely on the grounds of maslaha and maqasid shari‘ah. All arguments shall be based on al-Qur’an and al-Sunnah. Despite, government efforts in generating economy and wealth for Malaysian economic revenue through biotechnology, the goals must not conflict with Islamic principles, of maqasid shari‘ah.

2. GENETIC MODIFIED ORGANISMS (GMOs) FOR FOOD AND OTHER PRODUCTION

At the beginning stage of genetic development, Gregor Mandel, known as the ‘modern genetic father’ born in Austrian in 1922, discovered the fundamental principle of lineage through his experiments on *Pisum sativum* (bean). Mandel’s Laws led to a genetic concept, how to understand the genes acted and functioned. In 1952, James Watson and Francis Crick published their findings on the double helical structure of DNA in 3-dimensional form. This discovery leads to understand more on genetic code and transcription for protein formation. The revolution in genetic field took place in 1973 when the concept of DNA recombinant technology was focused in the research. Herbert Boyer and Stanley Cohen were the first scientists succeeded in creating the first recombinant DNA organism. Another important finding in the genetic field was the discovery of the method of determining the deoxyribucleic acid base sequences by Walter Gilbert and Frederick Sanger in 1977 (Sahilah 2018).

Since the 1980s, the development of GMOs and GMOs products has grown rapidly. In 1982, the Food and Drug Administration (FDA), the United States approved Genentech Humulin, a human insulin produced by bacteria. GM tomatoes that are slowly ripening known as tomatoes Favr Savr were produced in 1992, and they have been approved for commercial production by the USA Department of Agriculture (Nap et al. 2003). In the same year (1992), the FDA declared that genetic engineering foods were ‘not dangerous’ and did not require special controls. In 1994, the first genetic engineering plant in the European Union was approved in France. Whereas, the labelling of GMOs crop has been approved in 2000, of which 130 countries approved the International Biosafety Protocol at the Convention on Biological Diversity in Montréal, Canada. However, GMO food labelling has not yet being confirmed by 50 countries before it is enforced.

2.1. Trangenic Plant

A simple gene cloning techniques can be described as the DNA fragment comprising genes required, inserted into a circular DNA molecule known as a vector or plasmid. The positive features of the crops can be improved such as resistance to herbicides, insects and able to withstand various extreme weather or climatic conditions such as drought, floods and extremely hot or cold temperature (Uzogara 2000). The term ‘transgenic’ means an organism
contains genetic material into which DNA from an unrelated organism has been artificially introduced. Knowledge of genes can be transferred starting with ‘Ti plasmid’ or plasmid that induces tumor formation due to the presence of bacterial Agrobacterium tumefaciens. A. tumefaciens are pathogenic bacteria infect plants such as tomatoes, soya bean, sunflower and cotton but do not infect cereals. This bacterium can form a crown gall tumor due to Ti plasmids are able to integrate into plant gene.

Commercially produced Ti plasmid is able to bring along the inserted DNA gene in the plasmid and this recombinant gene is able to integrate into the plant genome. The plant is said to be a transgenic plant. Transgenic ‘Bt cotton’ indicated the cotton plant is GM with the Bacillus thuringensis gene. The genes are called crypes and function to produce proteins that kill the cotton pests such as lepidopterans (tobacco budworms, thousand caterpillars), coleopterans (beetles) and dipterans (flies, mosquitoes).

The transgenic tomato, also known as ‘Flavr Sarv’ in 1992, is a tomato that delayed the process of cooking and a fresh sensation when it was placed in the refrigerator. Initially the tomatoes will be ripening and tender due to the production of polygalacturonase enzyme, in order to maintain the freshness of the tomato fruit, the production of the enzyme should be prevented (Kramer & Redenbaugh 1994). The transgenic tomato has been genetically modified so that no polygalacturonase enzyme is produced, this causes the ripening process to slow down and the quality of the fruit is also enhanced.

The recombinant DNA application is also applied to the rice plant (Oryza sativa) for vitamin A added value in transgenic paddy. It calls genetic modified (GM) ‘Golden Rice’ which is enriched with β-carotene where β-carotene is a basic substance that converted into vitamin A. There are two genes inserted in the paddy plant for the β-carotene biosynthesis; psy (phytoene synthase) derived from the Narcissus pseudonarcissus plant and crtI (carotene desaturase) genes of bacterium Erwinia uredovora. The other GM crops are also commercialized such as soybeans, maize, papayas and brinjal (James 2009; Choudhary, Nasiruddin & Gaur 2014). There are twenty seven countries involve with GM crops and the global GM crops increased from 67.7 million hectares in 2003 to 175 million hectares in 2013 (James 2013). It is believed that the global GM crops will increase every year due to the demand of foods supply.

In Malaysia, Malaysian Agriculture Research and Development Institute (MARDI) leading in GM research. There are many GM plants have been developed from this institute, including papaya, pineapple, pomelo, orchids, rice chili and passion fruit and others (Rozhan & Daud 2007). While, Malaysian Palm Oil Board (MPOB) has also successfully developed GM palm oil (high oleic acid content), Malaysian Rubber Board (MRB) developed GM trees (human albumin serum antibodies against tooth decay) and Forest Research Institute Malaysia (FRIM) developed GM teak trees. In terms of imports, up until now there are only five authorized GM products in the Malaysian market such as Roundup Ready soybeans for food, feed and processing (FFP), Bt maize MON 810 (FFP), maize NK603 Roundup Ready (FFP), Bt maize MON 863 (FFP), and protein for ice structuring (a copy of protein from fish) extracted from GM yeast for use in Unilever ice cream (Lim 2010).

2.3. Transgenic Animals
There are several methods to form transgenic animals: 1. DNA microinjection; 2. Embryonic stem cell-mediated gene transfer; and 3. Retrovirus-mediated gene transfer and others. Transgenic animal or GM animals have been developed on mouse, cow, sheep, pig, fish, chicken and others. Mouse is used for human health research as a study model to enhance
understanding of gene function and genetic disease treatment mechanisms (Nguyen & Xu 2008).

GM cows produce various lysostaphin proteins, Bovine β, κ casein, lysozyme and lactoferrin in their milk have been developed. Among the benefits of transgenic cows are; the cows are produced a better quantity of milk; producing high nutrient content; and produce milk that contains beneficial ‘nutraceutical’ proteins. Nutraceuticals are the terms given to foods that have health and medical benefits. The production of beneficial proteins in milk by transgenic animals can increase the growth rate, health, and survival of the growing animals. The presence of high lysostaphin in GM cows are have good effects due to this enzyme acts as antimicrobial against *Staphylococcus aureus* (bacteria). Transgenic cows that produce these enzymes can increase the resistance to mastitis (Liu et al. 2014). Mastitis is an inflammation of the milk glands that are caused by pathogenic bacteria which infected cows and lowering the milk production.

The transgenic sheep is developed to improve the quality of wool. While, transgenic goat is developed to produce milk containing human growth hormones (Human Growth hormone, hGH), antithrombin III or Recombinant hAT-III are used for blood clotting, lactoferrin and lysozyme that exhibit antimicrobial properties. Environmental friendly phytase or ‘Enviro-pigs’ (Enviro-PigTM) were developed to reduce phosphorus pollution in the environment from pig farming operations. Pigs can not fully digest phosphate compounds and this causes phosphate contamination to the environment through animal feces. Additional supplements for digestive phosphate will increase the cost of commercial pig production. Thus, phytase transgenic pig was developed by inserting isolated phytase gene from *Escherichia coli*. Phytase enzyme produced in pork salivary glands causes digestion of phosphate compounds to be increased up to 75% (Golovan et al. 2001).

No report has been obtained for transgenic chickens, this due to chicken for human consumption was done by looking the chicken characteristics performed through the selection process and cross breeding between the breeds of chicken for a long time. Reports on chickens eat GM foods such as maize and soybeans are reported increasing 43% of chicken health (National Chicken Council 2013).

2.4. Transgenic Microorganisms

In transgenic microorganismst, there are two categories of transgenic microorganisms: 1. Genetically engineered microorganisms to produce products through fermentation processes such as antibiotics, enzymes, somatotropin hormones, insulin, ethanol, amino acids and others; 2. Genetically engineered microorganisms which their entire cells are used to control the oil spills in the environment or to remove toxic substances such as mercury and enzymes to decompose various hydrocarbon compounds in oil spills in the sea (Biologymad.com 2011). In this study, we emphasized on the GM food involving plants and animals but not deeply discuss on the microorganisms.

3. GOOD AND ADVERSE EFFECTS OF GENETIC MODIFIED ORGANISMS (GMOS)

3.1. The Benefits of GMOs

In reality, GMOs or GM Foods (GMFs) are produced as a step to meet the needs and demands of a growing world population, while improving the quality and quantity of food. In this discussion, we use GMFs which are referring to GMOs. The aim is also to provide food assistance to children suffering from malnutrition in third world countries such as Africa.
Currently, more than 842 million people, or two thirds of the world’s population suffer from hunger and malnutrition, while 1.3 billion people fall into the poor category with per capita income of less than $1 a day (The Royal Society 1999).

GMFs are products produced by agriculture-based multinational companies through genetic engineering. These companies have developed research to produce plants better seeds than from plants natural seed. Genetic engineering technology is used by scientists to produce plants that are not easily broken, resistance towards disease, increase growth and yield, leading to reduced food cost. Thus, farmers have high profits and enhance the standard of living.

According to the US National Nutrition Agency (USFDA) in their paper entitled, ‘The Boundaries/Borders of Biotechnology from the Humanitarian Perspective’, reported the GM plants have changed to their nutrients content in the whole foods. For example, there was an increase in minerals and antioxidants such as carotenoids, flavonoids and Vitamin A, C and E in GM fruits. Those nutrients help to reduce the oxidation rates and delaying damage caused by free radical in human body. Besides that, the benefit of GM vegetables and fruits produced by genetic engineering process will last longer in the market compared to non-GMFs (USFDA 2010).

3.2. The Adverse Effects of GMOs
Despite GMOs the benefits, here are many religious issues that need to be addressed as GMOs that use illegal gene genes need to be addressed. For example, the use of pigs gene inserted into paddy plants was conducted in Japan 10 years ago by Hiroyuki Kawahigashi with other researchers (Kawahigashi et al. 2005). They have published papers entitled, ‘Analysis of substrate specificity of pig CY2B22 and CYP2C49 towards herbicides by transgenic rice plants’ indicates that Muslim users have the potential to be exposed to this Haram gene. In addition, research on mouse genes has also been conducted in 2002 by Yamada and other researchers (Yamada et al. 2002). They published the research entitled, ‘Inducible cross-tolerance to herbicides in transgenic potato plants with rat CYP1A1 gene’. Mice genes are inserted into the genome of the potato plant thus the potatoes were tolerated to phenylurea herbicides such as chlorotoluron and methabenzthiazuron. Thus, there are undoubtfull, Muslim users have a potential to be exposed to GMOs that use animal genes which are not allowed by Shariah law.

In other issues is the ethic issues are also much discussed due to ligated of genes among different species can be done without limit. For example, the genes of pigs can be inserted into the paddy plant gene, the bacterial gene can be inserted into the cotton genes, the mouse genes can be inserted into the potato gene, the human genes are inserted into the genes of cattle, goats, and rats and others. The combination of these genes raises ethical issues, for example human lactoferrin genes have been inserted into the cow genes to enhance the dairy-rich antimicrobial activity (Liu et al. 2014). The question, is it ethical to combine human genes into cows? Or do you want to combine the mouse genes into potatoes in which you eat the product? Or is it ethical to combine the human gene into a mouse? (Gordon et al. 1987). Often ethical issues will be discussed much when they involve transgenic animals or GMOs, but less emphasis on transgenic plants. However, as previously mentioned the combination of pigs into paddy genes or rat genes into potatoes genes can cause a major concern for Muslim consumers.

The ethical issues are also discussed in transgenic animals because of animal well being, how much the animals total pain during the experiment. Animal deprivation in research
should be taken into account especially when experiments are conducted is failed and end up with disabilities and misery. For example for acquired mouse model of acquired immune deficiency syndrome (AIDS) research, the Alzheimer’s mouse and the oncogene mouse model are developed to look at the cancer disease treatment for human being.

The social issues face by farmers regarding GMOs are discussed under the Genetic Use Restriction Technologies (GURTs) of the Convention on Biological Diversity (CBD) where this convention has afforded and protects the flora and fauna of biological rather than GURTs. The diversity convention (UNEP/CBD/SBSTTA/4/9/Rev.1) provides an assessment of the agronomic (science of land for crop production) impacts and socio-economic against farmers where GMOs are adopted. The details are stated in UNEP/CBD/SBSTTA/4/9/Rev.1 documents.

The CBD’s concern over GURTs is where farming using a uniform crop system leading to elimination the local diversity. For example if the new GMOs rice seedlings are introduced in the local area, the local diversity of paddy seeds in that area will be forgotten thus, lose the local paddy diversity that they have been planting for so long. In other words, native seeds or indigenous seed crop that has been preserved for generations will lose the species if there is no GMOs restriction. Advantages and disadvantages of GURTs are documented in UNEP/CBD/SBSTTA/4/9/Rev.1 documents.

GMOs are also believed to have an allergic or allergic effect on the user. Allergic is a sensory impression of immune system (immune hypersensitivity) to certain substances such as pollen, legumes and seafood. The effects of these allergic causes the user to irritated and inflamed on the skin, respiratory disorders and digestive system, dizziness, vomiting and others. To avoid the undesirable incidents of the European Union (EU) want GMOs food is labeled.

GMOs produce new proteins that may have health effects on users. This is because in GMO genes there are bacterial genes, viruses and any genes selected to be inserted into vectors either from humans, animals, plants and microorganisms which are then combined into plants such as soy, corn, tomato, canola, cotton, rice and etc. The bacterial gene found in GMOs is gene resistance to antibiotic. This gene may cause the degree of resistance towards antibiotics in the intestine increases. While, the virus gene found in GMOs is a cauliflower mosaict virus (genus mosaic virus) gene that acts as a gene promoter that is believed effective and enhance genetic transfer. All these restructured genes will produce new proteins that may cause allergies to the user. In addition, the genes within GMOs will interact by randomly transferring genes into common organisms which will interfere the function of other genes in other organisms.

Since GMOs is an organism whose genes are restructured by humans, it may cause long-term adverse effects. Examples of studies conducted in the United Kingdom, allegic users of soybeans have increased by 50% after GMO soybean was introduced in 1999. Allegic effects on GMOs soybeans such as bowel syndrome, digestive problems, chronic fatigue, headaches, lethargy, skin irritation including acne and eczema. The Brazilian nuts (Betholletia excelsa) are well known for being allegic to consumers, but this nut is rich in amino acids methionin. To improve the nutritional quality of soy beans, 2S methionin rich in albumin from Brazilian beans has been introduced (introduced) into transgenic soybeans. The results show that allegic can be transmitted into other foods with genetic engineering (Nordlee et al. 1996).

4. MAQASID SHARI‘AH IN GMOS AND DERIVATIVE PRODUCTS

The terms maqasid al-shari‘ah and maqasid shar‘iyyah are used to express the same meaning. In the Arabic language, maqsad is the plural of maqsad, qasad, yaqsud, qasdan and
maqasidan, while al-qasid from the point of language has multiple meanings. They are al-i’tizam (aspire), al-i’timad (hold), al-amd (willfully), to ask for and to bring something (Husni et al. 2012).

Maqasid is a goal to be achieved in doing something. In this context, maqasid is defined as goals and objectives laid down by law. Various definitions of the term maqasid have been given by jurists. But earlier scholars did not define maqasid, even al-Shatibi (famous as the man who pioneered the maqasid) also never gave a specific definition to the notion of maqasid shari’ah (Nor et al. 2012). However, it does not mean that earlier scholars did not pay attention to the maqasid in making legal rulings. They issued several opinions to explain the meaning of maqasid shari’ah.

Islamic scholars have stated that maqasid shari’ah does apply to products of modern biotechnology. Elements of maqasid, namely maslahah and mafsadah, can be identified when there is a joint production of two products. Maslahah has been defined as a variety of meanings, it is the concept of benefit or rejection of any harm (al-Ghazali 1413H). ‘Izz al-Din ibn ‘Abd al-Salam (2000) said that it can be explained in two ways, first; in haqiqi, means pleasure and delight. Second; in majazi, means something that leads to excitement and passion. Al-Shatibi (1997) defined maslahah as a process to ensure the continuity and completeness of human life in all its aspects. There are also some scholars who defined maslahah as intended by the legislation, benefit for humans to preserve religion, life, intellect, lineage and their property (Kashim et al. 2015). Two important things can be inferred through these definitions. First, maslahah focuses on benefit, favour and enjoyment to people, and second, maslahah as an argument believed with full confidence without any doubts.

Islamic scholars are agreed that maslahah must meet the requirements of the legislation to be adopted. Maslahah is the preservation of the shari’ah objectives, which consist of five principles: the protection of religion, life, intellect, lineage and property (al-Shatibi 1997). In contrast, mafsadah is the opposite of concept to maslahah (al-Buti 2005) which is harmful effects on religion, life, intellect, lineage and property (Ibn ‘Ashur 2007). Not all maslahah can be used in the argument to formulate legal rules because there are adopted and also rejected maslahah. On that basis, Islamic scholars have divided maslahah into three types. Each type must be truly understood in order to apply in the issue of GMF. The three types of maslahah are as follows (al-Tabarani 1983): 1. Maslahat al-mu’tabarah (maslahah accepted by Islamic law because there is supporting evidence from al-Qur’an and al-Sunnah); 2. Maslahat al-mulghah (maslahah rejected by Islam because it is contrary to scripture of ijmam and qiyas); 3. Maslahat al-mursalah (maslahah that has no specific arguments about whether to accept or reject, but implicitly, it is intended by the legislation to be maintained).

The fact is that all maqasid adopted by the shariah scholars have clear values and supporting evidence from al-Qur’an and al-Sunnah. For that reason, the scholars applied those values and evidence to exercise ijtihad in making legal decisions. Therefore, in the biotechnology regrading GMOs from the Islamic perspective, the foods produced through biotechnology cannot be escaped from halal and haram concept. In Surah al-Baqarah, verse 172, means as follows: “O you who have believed, eat from the good things which we have provided for you and be grateful to Allah if it is [indeed] Him that you worship”. The Holy Qur’an and Sunnah view lawful and good foods as a fundamental matter, capable of affecting the life here and hereafter. According to Islam, the question of halal and haram food depends on the basis of the food, how it is produced, from what it is produced and who produced it (JAKIM 2010). Allah SWT has commanded Muslims to consume halal and good food, while avoiding all foods that are forbidden because of harm, impurity and danger. The purpose of
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5. APPLICATION OF MASLAHAH TO GMOS PRODUCTS

Al-Buti (2005) has outlined three essential conditions for exercising maslahah in order to meet maqasid shari'ah and the conditions are as follows:

5.1. Maslahah Must Not Contradict al-Qur’an and al-Sunnah

Every maslahah that contradicts these two major sources will be rejected even though it has many advantages or benefits. The reason is that these two main sources are the most important references in Islamic law. It should be noted that all the injunctions in the al-Qur’an and al-Sunnah are not detached from maintaining maslahah, as well as keeping away from all mafsadah. Allah SWT says in the Holy al-Qur’an in Surah al-Nisa’, verse 105 the following meaning: “Indeed, we have revealed to you, [O Muhammad], the Book in truth so you may judge between the people by that which Allah has shown you. And do not be for the deceitful, an advocate”. The word litahkuma bayn al-nas which means that Islam requires its followers to refer any matter to the al-Qur’an before determining any laws. Hence, maslahah or any good in GMF product cannot be lawful if the materials are conflict with the al-Qur’an and al-Sunnah.

5.2. Maslahah Must Not Contradict Ijma’ (Scholarly Consensus) and Qiyas (Analogical Reasoning)

Ijma’ and qiyas are vital instruments which are validated by al-Qur’an and al-Sunnah. Everything that contradicts these two determinants of laws is rejected despite there being maslahah in the product. After a legal decision is made by scholarly consensus, then there is no probability of error. Allah SWT says in the Holy al-Qur’an in Surah al-Nisa’, verse 115 which means as follows: “And whoever opposes the Messenger after guidance has become clear to him and follows other than the way of the believers - We will give him what he has taken and drive him into Hell, and evil it is as a destination”. This verse shows that every legal decision that has been determined by the provisions of the Prophet Muhammad (PBUH) through revelation must be obeyed. Similarly, ijtihad (independent interpretation of legal sources, i.e., al-Qur’an and al-Sunnah) exercised in accordance with the agreed texts and principles of ijtihad should be followed. Those who refuse all legal decisions are included among the lost and misguided.

5.3. Maslahah Must Not Exceed Maqasid

Maqasid shari’ah is intended to keep maslahah and prevent from mafsadah. Maslahah can only be achieved by preserving the most valuable things in the life of a human being, namely the five principles of shari’ah (al-daruriyyat al-khams) (al-Buti 2005). The five values in question are the protection of religion, life, intellect, lineage and property. Thus, if these five things can be preserved, then it is included in the maslahah, otherwise it is in mafsadah (harmful and illegal to approach) (al-Buti 2005).

This condition is usually applied when a choice has to be made between two unlawful options such as producing GMF from DNA of carcasses and letting a group of people starve to death, then the wise choice should be the more important of the two. If after deliberation, it is found that the use of DNA from carcasses is more practical and need to be prioritized to save a number of people from starvation and death, then the former should be chosen. In
another context, the risk of eating carcasses is lower than letting people die while there is a ready solution (Nor et al. 2012). Thus, it is clear that the use of maslahah must not conflict with the maqasid or a larger maslahah although both are allowed by Islam in an emergency situation.

6. THE IMPORTANCE OF GMOS MASLAHAH IN HUMAN PRESERVATION

The purpose of maqasid shari'ah is to maintain the maslahah (benefits) of mankind on earth. On the issue of biotechnology products such as GMF, maslahah needs to be preserved for human life or soul. Islam has allowed all kinds of halal and good foods and rejected any food which harm to human life and health. Islam has forbidden to eat any foods that are harmful, dangerous, and unclean either or a mixture of halal with haram substances. All these restrictions bring maslahah and distance from any harm and mafsadah at the same time. However, the exception to this prohibition is if an emergency situation which threatens human lives.

In the case of an emergency, the jurists have agreed to authorize the use of unlawful animal-based substances in the production of GMF products as prescribed as follows (Laluddin et al. 2012): 1. There are no halal sources that can replace haram sources; 2. The belief that not using the haram substance will threaten life and cause death; 3. The use of haram sources is to escape from famine by sadd al-ramq (save lives); 4. Obligation to seek halal foods while capable.

Upon examination of the conditions, it appears that something haram (unlawful) may be temporarily halal in an emergency situation. It should be noted that taking unlawful sources is not counted as maslahah but it is actually mafsadah to avoid a worse or bigger mafsadah. Ultimately, it is to preserve maqasid and greater maslahah, namely life. Accordingly, all types of GMF products based on animal feces must be examined based on need in a Muslim country. If the product is needed to preserve human life, then the GMF products are lawful according to the principle of darurat (emergency) based on Islamic law.

7. CONCLUSIONS

The existence of Islamic law is to protect human life and welfare in every aspect. These include the food production using modern biotechnology in accordance principles of maqasid shari’ah. Islam has outlined specific guidelines for its followers to eat pure, healthy, nutritious food to maintain a healthy body as well as the relationship between creature and Creator. The al-Qur’an and al-Sunnah do not specifically discuss the law of modern biotechnology. But, general principles must as accordance to both sources. The other legal instruments such as fiqh, ijtihad, maqasid shari’ah and etc., are also used to determine the legal status of modern biotechnology products. Today, ijtihad is widely used to address contemporary issues of legality when there is no specific or detailed discussion in the al-Qur’an and al-Sunnah. Islamic scholars need to have a variety of approaches and methods including the use of maqasid shari’ah to solve problems that arise within Muslim society. The legality of modern biotechnology products such as GMF does not merely rest on maqasid shari’ah but on the criteria laid down by the principles of al-Qur’an and al-Sunnah.

In the context of GMF food products, it cannot be detached from the halalan tayyiban principle as follows: 1. If the original gene found in the GMF products were taken from halal sources such as halal plants and animals, then it is halal for Muslims to consume, otherwise is haram for consumption and other indirect uses; 2. Biotechnology is beneficial for human
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being in all aspects of life. It gives a positive impact in health, life, financial and etc. In health, those products could save many lives using medicine biotechnology. However, the halalan tayyiban principle must be observed in order to preserve maqasid shari‘ah in human life; 3. Any threat to the five aspects of maqasid shari‘ah does not prevail over maslahah. Thus, each product of modern biotechnology that is believed to cause harm or threat to humans is haram and immediately rejected.

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