



# Beyond *Halal*: *Maqasid al-Shari'ah* to Assess Bioethical Issues Arising from Genetically Modified Crops

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## Abstract

Genetically modified organisms (GMOs) have increasingly dominated commodity crop production in the world in the endeavour to address issues related to food security. However, this technology is not without problems, and can give rise to bioethical issues for consumers, particularly Muslims. The Islamic perspective on GMOs is complex and goes beyond just the determination of whether food is *halal* or not. If the food is *halal*, but the process to obtain it is not *thoyibban*, as it is unethical, then the food cannot be permitted under the *Maqasid al-Shari'ah*. This paper examines ethical issues pertaining to GM crops and how the related ethical issues contradict with Islamic principles beyond the binary distinction between the contaminated and uncontaminated food. Since GM technology is a contemporary issue that may not be directly addressed in the al-Quran and Sunnah, other Islamic sources should also be referred to when drawing up this code of ethics to achieve the objective of Syariah (*Maqasid al-Shari'ah*). *Maqasid al-Shari'ah* can be applied to frame the Islamic bioethics guideline as it is comprehensive and encompasses moral principles directly applicable to modern biotechnology. The paper subsequently explores how the principles of *Maqasid al-Shari'ah* are applied in addressing these ethical issues.

**Keywords** *Halalan thoyyiban* · Islamic · Bioethics · GM crops · Farmers' rights · *Maqasid al-Shari'ah*

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## Introduction

The application of biotechnology in agriculture continues to be important in addressing issues such as global food insecurity and insufficiency (Ansari, cited in Laxman and Ansari 2011; Weiler et al. 2015). Over the last decade, genetically modified (GM) crops have been integrated into agricultural systems around the world and are thought to play a significant role in sustainable agriculture (Ronald 2011). As reported by the U.S. National Academy of Sciences in 2016, GM crops are as safe as non-GM food (National Academies of Sciences, Engineering, and Medicine 2016). There is sufficient empirical evidence that points to the fact that the benefits of GM food far outweigh the risks and therefore genetic modification technology, if applied rightly, has a distinct potential to address the looming global food crisis (DaSilva et al. 2002).

Nevertheless, the new modified genetic material not only expresses the edited features but also transfers them to its future offspring. This process has raised concerns around the use of GMOs as it could not occur naturally. New species of food are more resistant to certain insects, viruses, fungi and pesticides, which ease their production and increase yields. This process leads to changes in the natural ecological system and creates new beings which do not exist in nature and whose influence on the planetary balance is not yet known (Zupan 2019). Even if we are aware of GMOs in our food, it can still be difficult to know what form of genetic material has been used to produce the food because the industry is not yet highly regulated. In other words, consumers may be less familiar with the possible side effects, such as toxic effects and unexpected allergic reactions from consuming newly created substances. Unfortunately, the long-term effects of GMOs on human health are not yet known, and as a result, it leads to bioethical issues.

In the Muslim society, there is a growing interest in such bioethics generally, as well as in food ethics, and a shift in interest from focusing on food consumption to food production (al-Attar 2017). The fundamentals of Islam, namely *aqidah* (belief), *syariah* (law) and *akhlaq* (ethics/morality), serve as a guide for society, and are relevant to the whole of human life (Laldin 2006). To express belief in Allah, human beings must obey all of Allah's commandments in abiding by all that He permits and abstaining from all that He forbids which is called *hukum* and is part of *Syariah*. Based on these commandments, *akhlaq* or ethics is the spiritual value that guides the conduct of mankind in determining right or wrong (Amin et al. 2009). *Akhlaq* or ethics in Islam is based on the al-Quran and Sunnah. The Al-Quran and Sunnah do not describe the entire ethical spectrum in Islam directly; the al-Quran simply mentions the basic rules in Islam while narrations from the Sunnah describe how life should be conducted (Meri 2006) and guide Muslims on how to be righteous and be wary that unethical behavior will have a negative result or lead to punishment (Yaacob and Yaacob 2007). Since GM technology is a contemporary issue that may not have any direct assessment in the al-Quran and Sunnah, other Islamic sources like *ijmak* or Islamic scholars' consensus have also to be referred to al-Amidi et al. (1968), Qadri (1973) in clarifying any bioethical issues pertaining to GM crops and GM foods (Senan Mahmud and

Ahmed Kabbashi 2013). Nonetheless, the consensus of these Islamic scholars in GM technology must fulfill the requirements of Islamic Law (*Shari'ah*) by applying *Maqasid al-Shari'ah* in order to set a precedent to be applied by the Muslim society (Kamali 2009b).

The *Maqasid al-Shari'ah* is comprehensive and encompasses moral principles which can be interpreted as directly applicable to GM technology. In *Maqasid al-Shari'ah*, any conduct that is deemed ethical or permissible must fulfill its five purposes: preservation of religion, preservation of life, preservation of progeny, preservation of intellect, and preservation of wealth. Any GM technology application/product must fulfill the relevant purposes if it is to be considered as ethical. If any application/product violates any of the five purposes in successive order of importance, it is deemed as unethical.

1. Preservation of religion and morality (*Hifdh al-Din*)

*Ibadah* (worships) such as *salah*, *zakah*, fasting and *hajj* are the elements that are required for the maintenance of the very existence of preservation of religion and morality (al-Shatibi and Ibrahim Ibn Musa 1975; Masud 1977). Executing all these rituals will increase the *Iman* or faith of a person and will therefore deter a person from committing sin, becoming apostate and indulging in any action that will obliterate his *al-Din* (Laldin 2008).

2. Preservation of life (*Hifdh al-Nafs*)

The preservation of life requires protecting everyone's life which is regarded as equally important and obligatory to each and every individual and societies (Laldin 2008). To ensure a high quality of life, life must be protected in all circumstances (Kasule 2004).

3. Preservation of progeny (*Hifdh al-Nasl*)

The protection of progeny or *Hifdh al-Nasl* (Kasule 2004) is one of the essential elements of anyone's life (Laldin 2008). The insistence of *Shari'ah* on preservation of the progeny is intended for ensuring inter-generational equity in the distribution of wealth and prosperity, conservation of resources, and sustenance of the environment (Hasan 2006).

4. Preservation of intellect or mind (*Hifdh al-'Aql*)

The protection of the intellect or mind, *Hifdh al-'aql* (Kasule 2004) is secured by promoting the means for the growth of the intellect (Nyazee 2004). Islam commands education and the pursuit of knowledge so as to ensure intellectual well-being and the advancement of the arts, sciences and civilization (Kamali 2009a).

5. Preservation of wealth or property (*Hifdh al-Maal*)

The preservation of wealth or property, *Hifdh al-Mal* is to ensure that property receives the necessary protection and security. Islam has ordered that there should be no transgression and acquisition of the property of others without legitimate reasons and without proper contract (Laldin 2008).

Based on the five purposes of *Maqasid al-Shari'ah* above, what follows is an examination of the bioethical issues arising from GM crops to determine whether

the criteria of the *Maqasid al-Shari'ah* are fulfilled. *Maqasid al-Shari'ah* can be used as a practical tool in tackling bioethical issues pertaining to the application of GM technology and as focal points in decision-making (Saifuddeen et al. 2014). All requirements of the *maqasid* must be considered to ensure that the gene technology application being assessed is ethical and if consequently it should be permissible (Saifuddeen et al. 2014).

## Bioethical Issues of GM Crops

(a) GM crops must be *halalan thoyyiban* to preserve religion and morality

One of the major bioethical issues of GMOs for Muslims is whether food is *halalan thoyyiban* or not. The Muslims' food ethics are beyond the binary of what is traditionally considered *halal* (religiously or legally permissible) and *haram* (religiously or legally forbidden). Many Muslims argue that for something to be considered *halal*, it needs first to be *thoyyiban* (good, wholesome, and nutritious) (Dahlan-Taylor 2015). Good food should not only be wholesome and nutritious, but it must also be derived from trusted and reliable sources that do not involve unjust practices (e.g. *riba'* or usury; and monopoly), hurt the environment, or disturb the ecological balance. In Islam, the issue of *halalan thoyyiban* or permissible and good is paramount as all products to be consumed should be free from non-permissible or haram materials (Ahmed 2000). This means that in order for the food to be qualified as *halal* and good, specific religious dietary regulations need to be considered by Muslims, including that it should be free from any ingredients that are considered religiously forbidden, such as pork. Many Islamic scholars continue to debate this issue as there is no straightforward answer to deciding whether to accept or disapprove GM crops. For example, a Muslim would object to porcine genes being inserted into vegetables and fruits, especially if the modified products were not clearly labeled as containing such genes (Church of Scotland 1999; Ashraf et al. 2018). The Chairman of National Bioethics Council Malaysia, Abdul Majeed, is of the view that the use of GMOs does not contravene religious prescriptions as long as the usage adheres to the dietary requirements of Islamic law (Abdul Majeed 2002). Iran's Ayatullah Muhammad Ali al-Taskhiri, Secretary General of the International Forum for Bringing Islamic Schools of Thoughts Closer, agreed with the development of GM technology when it was suggested that any decision-making on this technology must be built and based on a scientific framework (Moosa 2009). According to Noor Munirah Isa and Sa'adan Man (2014), the application of GM technology must first and foremost be in harmony with Islamic Law. Hence, though GM technology promises positive impacts on agriculture and benefits to society, such as feeding the hungry and improving global food security, the GM products must be *halal thoyyiban*. The determination of acceptance is not merely on the *halal* or permissible status of food, but it is more complex and goes deeper to include components such as behaviour (procedures related to food practices in human groups [what, how much,

how, when, where and with whom people eat; food choice and aspects related to food preparation] associated with social and cultural characteristics), characteristics (increased nutrition, allergens modification and improved functional properties) and values (reduces risk and increases yield which benefits farmers) of the GM crops and foods that are good and pure for consumption.

Hence, comprehensive evaluations are necessary to ensure that the objectives of this technology do not violate the rules of Islamic law, and any adverse effects towards humans and environment are averted (al-Haydari, cited in Amin et al. 2010; Islamic Fiqh Academy (Jeddah), cited in Amin et al. 2010). In line with this principle, in 2001, Saudi Arabia banned products from Europe on the suspicion that the animals were given feed containing prohibited animal parts (Al-Zobaidy, cited in Khattak et al. 2011). This reflects that even the slightest suspicion of prohibited elements in products is taken seriously by Islamic authorities in order to safeguard the faith.

There is no direct information about GM technology in the Quran or Hadith,<sup>1</sup> as such technology did not exist at that time. However, in considering the status of GM crops and eventually GM food, determinations of *halal* or permissible and *thoyyib* or wholesome [healthy, safe, nutritious, quality] must be supported by other considerations. Doing good and avoiding harmful actions are also part of *thoyyib*. This means that crops must be produced with integrity and must be healthy for human consumption. The Quran has many passages regarding food ethics, specifically stressing that food must be good, pure and wholesome or *thoyyib*. The Al-Quran lays down several verses enumerating the significance of *halalan thoyyiban* when Allah orders His believing servants to eat good and lawful things that He has provided and to avoid bad things that He has forbidden as this can harm His servants in both religious and worldly affairs (Surah Al-Baqarah 2:168, 2:173). Allah Ta'ala further decrees that he has honoured His creations by providing them the *thoyyiban*, loosely translated here as lawful and right, and Allah Ta'ala then commands His servants and Messengers, to eat the right food and do righteous deeds (*halalan thoyyiban*), which indicates that eating what is lawful helps one to do righteous deeds to preserve their religion and morality (Surah Al-Ma'ida 5:1, 5:4–5, 5:87–88, 5:96).

The word *al-tayyibah* used in the Quran signifies things that are at once clean in themselves and which are obtained by honest and lawful means.<sup>2</sup> Concerning the *ijmak* as primary sources of Islamic law discussed above, the Fatwa Committee of the National Council of Islamic Religious Affairs Malaysia on 12th July 1999 came out with a consensus (*ijtihad*) to allow the use of GM products only if they follow the procedure set by the committee:

<sup>1</sup> The Quran and Hadith, being the fundamental sources of Islam, provide Muslims with guidelines and obligations that one must act upon to preserve a good and healthy life. Hence, in the case of decisions about GM crops, any decision-making must refer to these sources. Hadith in Islam refers to the record of the words, actions, and the silent approval, of the Islamic prophet Muhammad.

<sup>2</sup> *Tayyibat* in this article means agricultural produce, fruits, meat, and milk with all kinds of delicious and desirable flavors and colors and beautiful appearance, and fine clothes of all kinds of shapes colors and sizes, which they make for themselves or are brought to them by others from other regions and areas.

1. Products, food, and drink processed through pig DNA biotechnology are contradictory to Islamic law, and are forbidden;
2. Using pig DNA biotechnology in products, food, and drink manufacturing does not reach the level of *darurah* (necessity) as there are still other alternatives available;
3. This *ijtihad* is based on the usual *Fiqh* maxim stating that preventing harm is prioritized over gaining benefit. The products must also follow the *halal* standards to be consumable by Muslims (National Council of Fatwa Islamic Affairs Malaysia 1999).

And subsequently, the 95th Discourse of the Fatwa Committee of the National Council for Islamic Religious Affairs Malaysia convened on 16th–18th June 2011 agreed to rule that:

“the use of prohibited materials and materials harmful to human beings and the environment in the production of GM food is forbidden. On the other hand, the use of *halal* livestock is permissible provided that the animals are slaughtered according to the methods prescribed by the *Shari’ah*.” (National Council of Fatwa Islamic Affairs Malaysia 2011).

It is also stated in the Standards Malaysia that food and drinks containing products and/or by-products of GMOs or ingredients made using genetic material from animals that are non-*halal* by the *Shari’ah* law are not *halal* (Department of Standards Malaysia 2009). In 1998, at a Kuwait seminar on genetics and genetic engineering, it was acknowledged that there are adverse effects of GM food on human beings and the environment. It is unethical for a Muslim to take only *halal* food without considering the *thoyibban* aspects of the foods. Bioethical issues about GMOs go beyond the status of *halal*. It must be *halalan thoyyiban* which includes respecting Allah’s creation, the right to a healthy environment, the right to livelihood of the farmers as well as the right to choose food. The scholar, Isabel Schatzschneider, claims that GM food is not ‘*tayyib*’ if the crops could potentially cause harm to farmers, consumers, and the environment (Schatzschneider 2013). Hence, *halalan thoyyiban* GM food ought to be derived from *halalan thoyyiban* GM crops.

GMOs may intensify pathogenicity, emergence of a new disease, pest or weed, increase adverse effects not only on ecosystems but also on human health (Oliver 2014). For these reasons, the application of GM technology in food production should follow the strict requirements of Islamic law. GMO proponents say their goal is to increase nutritional benefits or productivity and the two main positive traits that have been added to date are herbicide tolerance and the ability of the plant to produce its own pesticide which is consequently not hazardous to the environment. These modifications may lead to two consequences—health benefits as well as significant negative health consequences (Fergusson 2019). Since there are no laws mandating that these ingredients must be labeled as genetically modified, consumers are most likely to consume genetically modified ingredients by mistake.

The GMO issue raises a major concern about the legitimacy of governing authorities. More than 40 countries have adapted labeling regulations

(Premanandh 2011). However, there are challenges to a harmonized labeling approach in GMO products as it is difficult to coordinate action in the regulation of GMOs at the international level. Legal regulatory frameworks are associated with three key bodies: The Codex Alimentarius commission which aims to protect the health of consumers in addition to ensuring fair trade practices internationally; The World Trade Organization (WTO), which is an international organization whose primary objective is to open trade for the benefit of all, and also help to maintain trade barriers to protect consumers, prevent the spread of disease and protect the environment; and the Cartagena Protocol on Biosafety, which seeks to protect biological diversity from the potential risks posed by living modified organisms resulting from modern biotechnology. Despite language in each of the three texts about “harmonization”, it needs to be recognized that they are separate agreements with divergent objectives, and that only through their application will countries realize the need to reconcile some of the apparent conflicts. Consequently, many Muslims nevertheless have doubts and concerns, and at a minimum, would prefer their food to be labeled to determine the *halal* status of the products (Amin et al. 2010). However, Islamic law does not prevent the advancement in genetic modification technology (Islamic Organization for Medical Sciences 1998). In the 2015 International Service for the Acquisition of Agri-biotech Applications (ISAAA) Report, Muslim countries are among the world’s top GMOs producers with Pakistan and Bangladesh which ranked at 8th and 27th respectively (International Service for the Acquisition of Agri-biotech Applications 2016). Thus, it can be said that because there exists a huge global Muslim market for GMOs, greater emphasis should be placed on the enforcement of the principles of *the Maqasid al-Shari'ah* in its production in order to preserve religion and morality.

(b) GM crops must not violate natural order

Violating the natural order is another issue in bioethics. Many people see GM technology as ‘playing God’ (Waytz and Young 2019) or putting people in the place of the Creator (Lassen et al. 2002; Waytz and Young 2019), as scientists are able to provide food supply to the world’s population by cutting across natural evolution and natural selection. This technology is completely changing organisms which can disrupt natural growth, hence there are debates to justify refusal of this technology (Mallinson et al. 2018).

Muslim jurists have discussed the alteration of Allah’s creations through scientific discoveries both in past and present times. In the primary source of the Islamic law, which is the Quran, although genetic modification is not mentioned directly, the alteration of Allah’s creations is not permitted, and any attempts at modifying living things would be a sin as stated in the Al Qur’an (Surah An-Nisa’ 4:119). Nevertheless, in the case of the improvement of nutritional values of plants for the welfare of humans, it is necessary for Muslims to observe some Islamic virtues and laws in the consumption of these products. However, if the change falls under the category of essential type or *daruriyyat*, then, such

a change or modification is permissible. For instance, if the GM technology is conducted to prevent harm, i.e. to reduce reliance on pesticides and herbicides, which damage the environment, such an experiment is permissible and is in line with the principle of *Shari'ah* that is promoting welfare and preventing harm. Furthermore, in order to create better livestock and crops, Islam does encourage gene modification that has been used for centuries using natural methods involving organisms of the same species. This shows that the Quran motivates Muslims to conduct research so as not to violate any natural order. This change or alteration in genes, however, is permissible if it is done with the intention to rectify a wrong, like preventing a disease within the boundaries of treatment laid by Islam.

There is a hadith where the Prophet (peace be upon him [pbuh]) approved the action of crossbreeding of date palms by the Arabs in his saying: “You are more knowledgeable in your worldly affairs” (Ṣaḥīḥ Muslim: 2363 Book 43, Hadith 186 in Sunnah.com 2020). In this hadith, the Prophet (pbuh) mentioned that he was the best person to refer to in religious matters, nevertheless when it comes to worldly affairs, he admitted that the experts knew better than him. This is evidence that Islam and *Shari'ah* do not put strict limitations on worldly affairs provided they are used, managed and utilized for the greater good. Therefore, it can be submitted that according to Islamic teachings, GM crops could be viewed in a positive light because they could benefit farmers and help produce better crops.

Therefore, Muslims must keep up with new research and discoveries and make connections within the scientific fields. As such, if one were to take the position that GM technology is conducted to reduce reliance on pesticides and herbicides, which pollute the environment, or feed the hungry, which is an action benefiting the welfare of the public, then this technology would be arguably justifiable under Islamic law.

From the perspective of Islamic bioethics, the whole universe is created by Allah to serve man and man is permitted to make the best use of it only if the religious and bioethical guidelines are observed and harms are avoided. In this regard, the principle of *Maqasid al-Shari'ah* should be applied to justify the necessity to alter the gene to enhance beneficial features and eliminate detrimental traits, and to explain the need to claiming legal ownership over such foods and products. The application of GM technology must be in line with *Maqasid al-Shari'ah* to protect and preserve faith. If this technology goes against the *fitrah*<sup>3</sup> as created by Allah, it is considered impermissible under the *Maqasid al-Shari'ah* and thus ethically unacceptable to Muslims.

### (c) GM crops must not cause gene pollution

Another bioethical issue arising from GM crops is the potential gene flow at both the planting and harvesting levels. This gene flow can cause co-occurrence between organic, non-GM crops and GM crops production, leading to

<sup>3</sup> *Fitrah* according to the Quran is the original state in which humans are created by God. In this article, *Fitrah* refers to a natural predisposition for good and for submission to the One God- Allah.



commingling of GM crops and non-GM crops known as gene pollution. Gene pollution is the term of genetics in which the genetic information is transferred into the organisms where it is not needed or where this information never existed before (Prakash et al. 2011). This flow of genetic information is usually undesired and cannot be controlled. Not only does gene pollution affect seed pureness, but it also has serious effects for organic and non-GM organic farmers who face economic harm due to lost markets or decreased crop values.

The financial burden associated with gene pollution is significant. Some of the costs on non-GM crops and organic farmers include the loss of market access, risks to long-term investments associated with the crop or one type of production, and the expense of putting in place preventative measures to avoid gene pollution (Gealy et al. 2007). Additionally, consumers who are interested in buying non-GM foods know that they can rely on organic and non-GM labeled food products, but the threat of pollution reduces the confidence that consumers have in those products (Food & Water Watch 2015). The undermining of consumer confidence is yet another cost of gene pollution or even of just the threat of gene pollution to the farmers. If polluted, farmers producing non-GM crops and organic crops can lose access to international markets because many countries have strict GMO regulations and labeling requirements.

*Marsh v Baxter* is a landmark case for GM crops pollution in Australia. The case delivered a big win for GMO farmers and produced no protection for organic farmers. The case pitted farmer against farmer. Organic farmers Steve and Susan Marsh initiated the legal action against their GMO growing neighbour, Michael Baxter in the Supreme Court of Western Australia. Their farms are adjacent to each other in the wheat belt of Western Australia (WA). Just before Baxter's first crop of Monsanto's GM Roundup Ready (RR) canola was harvested, the standing crop was sprayed with herbicide (glyphosate), and rather than being direct harvested, the crop was swathed, for collection in 2 or 3 weeks. GMO swathes, seeds and plant material were subsequently found dispersed over much of Marsh's farm. As a consequence, 70% of Marsh's farm lost its organic certification. Marsh sued Baxter for economic loss on the basis of common law negligence or private nuisance, and sought a permanent injunction, initially to stop Baxter in future planting GM canola in paddocks adjacent to Marsh's organic fields and finally lessened to stopping Baxter harvesting GM canola by swathing in adjacent paddocks. The case was dismissed in its entirety—no nuisance, no negligence, no injunction, and no damages. The cornerstone of the case was that Marsh's organic farm had been "contaminated" with GMO plant material. There was no dispute that GM canola plant material was blown onto 70% of Marsh's farm, no dispute that it came from Baxter's farm, and not even any dispute that Baxter's chosen harvesting method of swathing created the precondition for the wind to blow the GMO material into Marsh's farm. However, the case foundered on the characterisation of what the judge referred to as the "incursion" of the GM canola and he rejected it as "contamination". The failure to cross this necessary Rubicon was fatal to the case (*Marsh v. Baxter* 2014). The case was appealed to the Court of Appeal (WA) in March 2015 with three judges presiding. The appeal was lost by majority verdict (2:1).

Furthermore, farmers who unintentionally grow patented GM seeds or who harvest crops that are cross-pollinated with GM seeds could face costly lawsuits by biotechnology firms for “seed piracy.” Monsanto has filed more than 145 patent infringement lawsuits against farmers (*Percy Schmeiser and Schmeiser Enterprises Ltd. v. Monsanto Canada Inc. and Monsanto Company* 2004; Schneider 2011). Regardless of whether a farmer intentionally or unintentionally grow patented GM seeds or harvest crops that are cross-pollinated with GM seeds, the commingling of GM crops and non-GM crops leads to financial implications of patent infringement lawsuits that seem unjustifiable especially to poor farmers.

This causes ethical issues whereby the GM crop causes more harm than benefit to the environment and farmers’ lives as it undermines the purity of organic natural creation of plants and jeopardizes the livelihoods of the farmers through gene pollution. This can lead to the destruction of not only the sustainability of biological diversity but also the socio-economic concerns of the farmers (such as losing the right to livelihood due to gene pollution and inability to save the traditional knowledge due to intellectual property rights (IPR) of the biotech corporation). Hence, these ethical concerns do not achieve the purpose of *Maqasid al-Shari’ah* to preserve biodiversity as well as the livelihood of the farmers. The application of *Maqasid al-Shari’ah* is essential for ethical decision making which manifests the protection and preservation of benefits and rights of GM technology stakeholders. Jeopardizing the livelihood of farmers is unethical in Islam as in principle, the implementation of the Islamic law as a whole aim to save and preserve the welfare of human life and avoid any disadvantages. Islam is built on the rule of causing no harm, thus one of the legal mechanisms to ensure that the GM products are not harming the community is through labelling as to protect the progeny. By having the labelling, the problem will be reduced, as the labelling embossed on the products will specify the status of the products. Conformity to the labelling will protect the community against impurity and harmfulness of products or even activities, which are prohibited by the *Syariah*. The protection of progeny is essential under the fourth purpose of *Maqasid al-Shari’ah*. The insistence of *Shari’ah* on preservation of the progeny is intended for ensuring inter-generational equity in the distribution of wealth and prosperity, conservation of resources, and sustenance of the environment (Hasan 2006). All applications of GMOs should ensure that the protection of progeny is not at any risk. GMOs applications which endanger progeny are prohibited under the *Maqasid al-Shari’ah* framework. The form of protection of progeny can be achieved through the mandatory GMOs labelling as consumers will be affected if GMOs are not safe to be consumed. On the issue of GMOs, *maslahah* (benefits) needs to be preserved for human life and progeny from any harm. In line with the need to protect progeny, all applications of GMOs should be labelled in order to make sure that consumers’ progeny are protected from any health risks and to ensure the foods are *halalan thoyyiban*. Accordingly, any type of causing harm to others is forbidden. Thus, gene pollution is one of the types of causing harm to the preservation of life; hence, this objective should be considered in the ethical decision of GM crops application.

Apart from that, the ownership of GM seeds results in a monopoly which deprives especially poor farmers, which leads to oppression. The monopolization and an oppressive contract of GM seed companies could affect the preservation of

traditional knowledge of the farmers. It threatens the fourth objective of *Maqasid al-Shari'ah*, which is the protection of intellect. Intellect is the basis of human beings' free will and accountability. They are able to choose freely between right and wrong, truth and falsehood, belief and disbelief: "We showed him the Way: whether he be grateful or ungrateful (rests on his will)" (Qur'an 76:3). It is evident in this verse that Allah has guided human beings to know what is good and what is bad. With the intellect, farmers are able to transform themselves, act morally and to do things in their traditional way, such as replanting and resowing the seeds. Consequently, any change or alteration becomes impermissible if it includes alteration of the genes such that it could be potentially harmful to offspring in the future which would violate the purpose of *Maqasid al-Shari'ah* to preserve life and progeny. It is at the discretion of human beings provided that the decision made will not violate the *Maqasid al-Shari'ah* that is in preserving religion, progeny, intellect and wealth (al-Zuhayli 1989). Relatively, the objective of preserving intellect should be the basis in the ethical decision-making process of GMOs technology. With better understanding of the five purposes of *Maqasid al-Shari'ah* framework, bioethical concerns relating to GM technology could be ascertained and evaluated.

## Conclusion

Even though there may be bioethical concerns regarding GM technology and GM crops, there is adequate empirical evidence to say that GM technology has the capacity and capability to generate income and promote the well-being of society in general. The success of marketing GM products to Muslim consumers strongly depends upon how strictly the principles of the *Maqasid al-Shari'ah* are applied in assessing the *halal* quality of the GM products. *Halalan thoyyiban* food should not only be wholesome and nutritious, but it should also be derived from trusted and reliable sources that do not involve unjust practices such as usury and monopoly; hurt the environment or disturb the ecological balance. It should also be free from any ingredients that they consider religiously forbidden, such as pork. It is paramount to educate GM crop producers about the importance of *halalan thoyyiban* products to Muslims because this understanding and appreciation of Islamic bioethics may provide farmers and entrepreneurs with a bigger global market for GM crops. As Islam is a complete, dynamic and holistic religion, everything that happens can definitely be handled by Islamic ethics properly guided by verses from the al-Quran, narrations from the Sunnah and other Islamic sources. In addition to the legislative practices of GM technology to avoid causing unintended harm to humans and the environment, all applications of GMOs should be labelled to make sure that the purposes of the *Maqasid al-Shari'ah* are protected from any form of transgression.

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