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GENETIC ENGINEERING IN FOOD CROPS: ANALYSIS SYARIAH MAQASYID

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Abstract

Genetic Engineering is one of the technologies that is quite rapidly developing in this modern era in the branch of science, to produce better living creature seeds. Genetic engineering brings many benefits to living things, but sometimes raises debate from a religious perspective. Many argue that genetic engineering is against the nature given by God Almighty to humans. In science there are several branches of genetic engineering, one of which is carried out on food crops. In this study, the researcher tries to provide an analysis of genetic engineering taken from the perspective of maqasyid sharia. This research is qualitative with a literature study method accompanied by descriptive analysis to provide a clear picture and explanation and analysis. According to the Islamic law perspective through the Indonesian Ulema Council issued a Fatwa that allows genetic engineering for good purposes, but rejects genetic engineering if it is used for personal gain and can cause deviation in its practice. From the research results, genetic engineering is still needed especially for plants, because in the science of maqasyid sharia from the five pillars of maqasyid namely Hifz Nafs, Hifz Mal, Hifz 'Aql, Hifz Nasl, and Hifz Din, none of them significantly violate and contradict the sharia. And if we weigh the benefits obtained from genetic engineering in food crops, it is greater than the harm produced. The analysis of maqasyid sharia permits genetic engineering as long as it has good goals and benefits for humans.

Abstrak

Rekayasa Genetika merupakan salah satu teknologi yang cukup pesat perkembangannya di era modern ini dalam cabang ilmu pengetahuan, untuk menghasilkan benih makhluk hidup yang lebih baik. Rekayasa genetika membawa banyak manfaat bagi makhluk hidup, namun terkadang menimbulkan perdebatan dari sudut pandang agama. Banyak yang berpendapat bahwa rekayasa genetika bertentangan dengan kodrat yang diberikan Tuhan Yang Maha Esa kepada manusia. Dalam ilmu pengetahuan terdapat beberapa cabang rekayasa genetika, salah satunya yang dilakukan pada tanaman pangan. Dalam penelitian ini, peneliti mencoba memberikan analisis tentang rekayasa genetika yang diambil dari perspektif maqasyid syariah. Penelitian ini bersifat kualitatif dengan metode studi pustaka disertai dengan analisis deskriptif untuk memberikan gambaran dan penjelasan serta analisis yang jelas. Menurut perspektif hukum Islam melalui Majelis Ulama Indonesia mengeluarkan Fatwa yang membolehkan rekayasa genetika untuk tujuan yang baik, namun menolak rekayasa genetika apabila digunakan untuk keuntungan pribadi dan dapat menimbulkan penyimpangan dalam praktiknya. Dari hasil penelitian tersebut, rekayasa genetika masih diperlukan khususnya untuk tanaman, karena dalam ilmu maqasyid syariat dari lima rukun maqasyid yakni Hifz Nafs, Hifz Mal, Hifz 'Aql, Hifz Nasl, dan Hifz Din, tidak satupun yang secara nyata melanggar dan bertentangan dengan syariat. Dan jika ditimbang manfaat yang diperoleh dari rekayasa genetika pada tanaman pangan, maka lebih besar dari mudharat yang ditimbulkannya. Analisis maqasyid syariat membolehkan rekayasa genetika sepanjang memiliki tujuan dan manfaat yang baik bagi manusia.

INTRDUCTION

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Technology that is increasingly developing and advanced, will be very useful in various fields, especially in the field of science. Genetic Engineering is one part of Modern Biotechnology that is developing very rapidly. Genetic engineering is also an application of technology in the field of science. Along with the era that continues to advance and develop, genetic engineering will certainly produce many benefits or advantages for humans.[1]

Since the development of the first genetically engineered crop about thirty-one years ago, transgenic technology has had a significant impact on the development of Indonesian society, especially by increasing crop production tremendously. Genetic modification technology has several advantages over traditional breeding and selection methods to improve plant traits. For example, traditional breeding can only be applied if a desired trait is possessed by the same species, since members of two different species cannot be crossed. Genetic modification technology makes it possible to insert genes into plants to engineer different traits such as increased photosynthesis, phytoremediation, biofortification and resistance to pathogens.[2]Nearly 2,000 studies have been published evaluating the safety of genetically engineered crops, and so far the results show that the impacts on food and environmental safety are not significantly different from conventionally grown crops. However, there is still skepticism about this technology both because of the risks to crop cultivation in the field and its environmental safety.[3]

In fact, the development of biotechnology is very beneficial, for example, grafting of a superior plant gene, grafted into an object plant, will produce a plant like the grafted plant. In addition to providing very beneficial benefits, on the other hand, it will sometimes cause rejection or opposition from a religious perspective. What if this genetic engineering is applied to humans to produce superior and flawless offspring, of course it will result in opposition from the general public and from a religious perspective, because it is considered against the nature given by God Almighty. Religion is still relevant and must always go hand in hand with the development of the times, especially developments in the medical field.

We take one of the themes, namely Genetic Engineering of Food Crops Analysis of Maqasyid Sharia. Genetic Engineering itself has actually been beneficial for mankind, but this is still a pro and con that is still being debated in society, many argue against one of which is because it is against the nature given by God Almighty and there are still many other arguments against this genetic engineering. Then how does Islamic law respond to this hot issue. For that we are interested in writing a discussion about Genetic Engineering in Food Crops Analysis of Maqasyid Sharia. This discussion aims to provide answers by analyzing with Maqasyid Sharia against genetic engineering in these food crops.

METHODS

This research is a library research that exploits sources in a specific field related to this research. To obtain the data needed in this research, the author uses the documentation method, namely collecting, reading and analyzing data related to this research such as books, journals, fiqh books, printed media and other data relevant to this research. The sources of this research consist of two sources, namely primary sources which are used as the main source and also secondary sources which

[1]Julius Angga Saputra; Kefas Panji Alexandrea; Izra Narendra; Raynaldi; Muhammad Fathin Raflianto, Genetic Engineering According to the Perspective of Religion, Jaya Development University Moderation: Journal of Contemporary Islamic Studies (2023), 4

[2]Tretno Dwi Andayani, Widyana Rahmatika, Nur Fitriayah, Genetic Transformation: Opportunities and Challenges, Agrineca Scientific Journal, Vol. 23 No. 1 2023, 80

[3]Hadi Susilo, Analysis of Transgenetic Plant Cultivation Potential in Indonesia, Environmental Journal Vol. 2 No. 1 2019, 5

are used as supporting sources. So that the preparation of this research is expected to be able to provide answers to the problems studied.

RESULT AND DISCUSSION

DISCUSSION

Food genetic engineering or commonly called recombinant DNA is a science that involves genetic modification of plants and animals. This has long been practiced by farmers since the beginning of history that has been developed using current technology. Some foods consumed today come from genetic engineering modifications or contain ingredients that have undergone gene modification. Food genetic engineering has several benefits, but this technology is followed by various controversies.[4]

Transgenic plants or Genetically Modified Organisms (GMOs) are organisms that exist in living things and are changed or mixed with other genes through genetic engineering techniques.[5]

In its own development, GMO products are increasing due to increasing needs and demands. The presence of GMOs that use biotechnology processes plays an important role in food needs in today's country. Biotechnology itself means the use of a living organism or life system to solve problems or create products that are beneficial to humans. So it can be said that biotechnology is genetic engineering or an action to change the gene structure by inserting new genes into the gene structure used.[6]

Genetic engineering is the pinnacle of biotechnology development and is inseparable from other branches of biology such as molecular biology, biochemistry, and physiology. Modern biotechnology has great potential to improve life and well-being for humans. The results of genetic engineering are then used to meet the needs of everyday human life.[7]

The aims of Sharia

Maqashid al-syari'ah, as emphasized by Abdul Wahab Khallaf, is a very important thing that can be used as a tool to help understand the wording of the Qur'an and Sunnah, resolve conflicting arguments and, what is even more important, to determine the law for cases that are not covered by the text of the Qur'an and Sunnah.[8] The theory of maqashid cannot be separated from the discussion of maslahah. This is because in fact in terms of substance, the form of al-maqashid al-syari'ah is maslahah. In the view of Asy-Syathibi, Allah revealed the sharia (legal rules) with the aim of creating human welfare both in the world and in the hereafter. The main purpose of the provisions of the sharia (maqashid alsyari'ah) is reflected in the maintenance of the pillars of human welfare, as stated by Asy-Syathibi, which includes five maslahahs by providing protection against being maintained: 1. religion (hifz ad-din), for example reading the two sentences of the shahada, performing prayer, zakat, fasting, hajj; 2. soul hifz an-nafs and 3. reason (hifz al-'aql). for example food, drink, clothing, shelter; 4. descendants (hifz an-nasl) and 5. property (hifz al-māl), for example in transactions.[9]

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[4]Pramashinta, Riska, Hadiyanto, Bioteknologi Pangan : Sejarah manfaat dan Potensi Resiko, Review Jurnnal Aplikasi Teknologi Pangan, Vol. 3 No. 1, 2014, 4

[5]Yuwono Prianto, Swara Yudhasasmita, anaman Genetically Modified Organism (GMO) Dan Perspektif Hukumnya Di Indonesia, Al-Kauniyah: Jurnal Biologi 10, no. 2 (2017): 133–42,

[6]Seprianto, Modul Matakuliah Bioteknologi Dasar (IBD 121), 2017, 1–102. 3 Dyah Ochtorina Susanti, Hukum Bioteknologi (I) Perlindungan Hukum Terhadap Bioteknologi Bidang Pertanian Dan Kesehatan: Perspektif HAKI Dan Lingkungan. (Yogyakarta: Laksbang Justitia, 2019), 4.

[7]Amy Estiati and M. Herman, Regulasi Keamanan Hayati Produk Rekayasa Genetik Di Indonesia, Analisis Kebijakan Pertanian 13, no. 2 (2016): 129, https://doi.org/10.21082/akp.v13n2.2015.129-146.

[8]Abu Zahrah, Muhammad. Ushul al-Fiqh. Mesir: Dar al-Fikr al-'Arabi, 1958, 78

[9]Sulaeman, Signifikansi Maqashid Al-Syari'ah Dalam Hukum Ekonomi Islam, Jurnal Syari'ah dan Hukum Diktum, Vol. 16, No. 1 Juli 2018, 101

The objectives of the Shari'a can be divided into several levels, including: First, Al-Dharurat, which is the most urgent interest or primary need and has the highest level. An example of its application is in preserving life, such as in the implementation of the law of qishas and the restriction of alcoholic drinks to preserve reason. This concept was later known as "al-Dharurat al-Khamsah". Second, Al-Hajat, which is a secondary or incidental interest, such as giving the guardian the power to care for his daughter in order to maintain harmony between husband and wife. Third, Al-Tahsinan and Al-Tazyinat, which include interests that beautify and improve, are tertiary, and only function as decoration. For example, the witness of a slave is not accepted in cases involving their people because of the difference in status. This division helps to determine priorities in maintaining interests according to their level of urgency and relevance.[10]

Al-Syatibi argues that the achievement of human welfare can be realized if the five basic elements of human life can be realized and maintained properly. The five elements include aspects of religion, soul, reason, descendants, and property. In this context, Al-Syatibi classifies maqashid into three levels, namely dharuriyat (basic needs), hajiyat (urgent needs), and tahsiniat (needs that are of an increasing or improving nature). The concept of maqashid according to Al-Syatibi reflects the main interest in maintaining and improving human welfare through the fulfillment of essential needs and improving the quality of life, namely: [11]

a. Dharuriyat

Needs at the daruriyyat level are related to the maintenance and fulfillment of basic or essential needs for the life of Muslims. Daruriyyat needs are defined as urgent needs. If the needs at this level are not met, this can endanger the safety of humanity, both in worldly life and the hereafter.[12]

Maqashid sharia in the dharuriyat category can be divided in more detail into five aspects, known as al-kuliyat al-khamsah, namely:[13]

1) Hifdz din, which includes supervision of religious norms, both in terms of faith and charity, to maintain the cleanliness and holiness of religion.
2) Hifdz nafs, aims to protect the right to life of individuals and society as a whole, including efforts to eradicate infectious diseases and enforce punishment for perpetrators of murder.
3) Hifdz aql, focuses on preventing intellectual defects that can inhibit thinking power and creativity, by protecting the mind from damaging influences such as alcohol and narcotics.
4) Hifdz nasl, tries to maintain the continuity of generations by facilitating the marriage process and avoiding policies that can stop the continuity of life, such as vasectomy and tubectomy.
5) Hifdz mal, related to the development of people's economic resources, protection of private property rights, and maintaining the security of property.

b. Hajj

Hajjiyat is designated as a secondary need, becoming important even though it does not directly threaten safety, but it can cause difficulties. Islamic law plays a role in overcoming all these difficulties. A concrete example of Islamic law's concern for these needs is the existence of the law of rukhsah (leniency), as explained by Abd al-Wahhab Khallaf.[14]

c. Tahsiniyat

[10]Tanza Dona Pertiwi, Sri Herianingrum, Menggali Konsep Maqashid Syariah: Perspektif Pemikiran Tokoh Islam, Jurnal Ilmiah Ekonomi Islam, Vol. 10 No.1, 2024, 9

[11]Tanza Dona Pertiwi, Sri Herianingrum, Menggali Konsep Maqashid Syariah: Perspektif Pemikiran Tokoh Islam, Jurnal Ilmiah Ekonomi Islam, Vol. 10 No.1, 2024, 5

[12]. C. S. Ningsih, Comparison of Al-Syatibi and Thahir Ibn Asyria's Thoughts on Maqashid Shari'ah. Jurnal Ilmiah Mizani: Wacana Hukum, Ekonomi, dan Keagamaan, Vol.. 8 No. 1 2021, 11-21

[13]Abdurrahman Kasdi, Maqasyid Syariah dan Hak Asasi Manusia, Jurnal Penelitian Vol.8 No. 2 Agustus 2019

[14]B. C. S. Ningsih, Comparison of Al-Syatibi and Thahir Ibn Asyria's Thoughts on Maqashid Shari'ah..,

Tahsiniyat is an effort to perfect the two previous maqashid, involving perfection in regular habits and noble morals. This third refinement or need has an important role in supporting the improvement of the dignity and status of a person's life, both in society and before Allah SWT, while still adhering to reasonable limits and obedience[15]. Based on his deeper analysis, Al-Syatibi put forward a correlation between maqashid dharuriyat, hajiyat, and tahsiniyat in a certain form. First, maqashid dharuriyat is considered as the foundation for maqashid hajiyat and tahsiniyat. Second, damage to maqashid dharuriyat can have a negative impact on maqashid hajiyat and tahsiniyat, while conversely, damage to maqashid hajiyat and tahsiniyat will not damage maqashid dharuriyat. Third, there are situations where damage to maqashid hajiyat and tahsiniyat which are absolute in nature can result in damage to maqashid dharuriyat. Therefore, maintaining maqashid hajiyat and tahsiniyat is necessary to properly maintain maqashid dharuriyat. Thus, Al-Syatibi argues that in an effort to achieve the maintenance of the five main elements perfectly, the three levels of maqashid cannot be separated. In more detail, the level of hajiyat is considered as a refinement for the level of dharuriyat, while the level of tahsinyat is considered as a further refinement for the level of hajiyat. In Al-Syatibi's perspective, dharuriyat is the basis for hajiyat and tahsinyat.[16]

Human Needs in Agriculture

Genetic engineering in food or Genetically modified food (GMF) is currently a hot topic, especially genetic engineering of food or commonly called Genetically modified food (GMF) is food that is produced or uses genetic modification techniques. Genetic modification or genetic engineering is an activity that is deliberately carried out to manipulate genetics with modern biochemical and biotechnology techniques. In the process of genetic alteration with modern biotechnology activities with recombinant DNA (rDNA), cloning or similar techniques by transferring a certain trait that is purely genetic, from one species to another species to create a new species that is far superior.[17]

Genetic engineering, also known as transgenics, is a method in biotechnology that involves transferring genes from one organism to another. Advances in genetic engineering technology, such as Genetically Modified Organisms (GMOs), have resulted in transgenic plants that have new characteristics to improve agricultural production and the quality of food products.[18]

The rapid growth of the food industry in Indonesia is also influenced by changes in people's lifestyles and their views on food and beverage consumption. The growth of the food industry is closely related to rapid population growth, changes in consumption patterns that tend to be instant, and limited natural resources. According to Suwardike[19]As a result, many food industries have begun to turn to genetically engineered crops with the aim of increasing production, product quality, and resistance to disturbances. Production management focuses on creating new products with higher sales or economic value through the application of knowledge and technology.

Genetic engineering of food is considered necessary because it can produce products of very good quality because it is considered to have properties that are resistant to pests and herbicides including those caused by viruses. Genetic engineering of food can produce food products that have complete and nutritious content.[20]

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[15]*Ibid*..,

[16]Tanza Dona Pertiwi, Sri Herianingrum, Menggali Konsep Maqashid Syariah: Perspektif Pemikiran.., 6

[17]M. Agustin, *Permasalahan belajar dan inovasi pembelajaran*, (Bandung: Refika Aditama, 2011), 34

[18]Guspri Devi Artanti, Hardinsyah, Dewi Ketut Sandra Swastika, Retnaningsih, Analisis Faktor-faktor yang mempengaruhi Penerimaan Petani Terhadap Produk Rekayasa Genetika, Jurnal Gizi dan Pangan Vol.5 No. 2, 2010, 115

[19]Putu Suwardike, Quo Vadis Pangan Produk Rekayasa Genetik di Indonesia, Agro Bali (Agricultural Jurnal) Vol. 2, No. 1, 2019, 58

[20]Siti Naila Nafasya Glen; Shafa Safira Azzahra. Universitas Pembangunan Jaya, Pengaruh Teknologi Rekayasa Genetika Terhadap Keberlangsungan Hidup Manusia Ditinjau Dari Pandangan Agama Islam, Moderasi: Jurnal Kajian Islam Kontemporer (2023) 1:1, 1-25

The use of genetic techniques in agriculture is expected to contribute, both to help understand the basic mechanisms of the metabolic process or in its practical application such as to develop agricultural crops with superior properties. To achieve this goal can be done through cloning or transfer of genes encoding economically important properties in plants, the use of DNA clones as markers or markers in helping to increase the efficiency of selection in breeding programs.[21]

For the general public, whether their food is genetically engineered or not may not be a primary consideration, as their focus is on price and availability of food. However, for scientists, governments, and stakeholders in the food industry, ensuring sufficient and quality food is a challenge that must be overcome. Other challenges include increasing population growth, increasingly limited agricultural land, and uncertain climate change. Reliance on conventional agriculture is considered inadequate to meet food needs and poses a risk of food insecurity.[22]

RESULT

Genetic Engineering of Food Crops Analysis of Maqasyid Syariah

Genetic engineering technology in food and its impact on human survival from a religious perspective is a significant topic. The sustainability of genetic engineering technology raises various ethical and moral questions, especially to what extent we can intervene in the genetic structure of plants and food. While global food needs drive this innovation, it is also important to consider its long-term impact on nature, human health, and religious values. Sutamo said[23] Genetic engineering technology can help in increasing crop productivity to meet the increasing global food needs."

The pro-transgenic plant community mainly sees the potential for transgenic plants to overcome the food crisis, reduce pesticide use, and produce more nutritious foods and tends to argue that transgenic use is not dangerous. The group against/rejecting argues that there is concern that GMOs have the potential to cause allergies in humans. Secondly, the environmental impact, transgenic products can disrupt the balance of the ecosystem because they can make pests or weeds resistant (resistant) in the environment. And thirdly, the halal aspect, GMO products are feared to be haram if the inserted gene comes from a part that is forbidden, such as the human body or pigs.[24]

Gilang[25]explained that in fact, the justification for using biotechnology to produce genetically engineered plants can be found in a seminar entitled Genetics, Genetic Engineering, the Human Genes, and Genetic Treatment - An Islamic Perspective organized by the Islamic Fiqh Academy, Jeddah, the World Health Organization Regional Office, Alexandria, and the Islamic Education, Science and Culture Organization (ISESCO) in Kuwait in 1998. In the Seminar, the following principles were agreed upon by all Seminar Participants:[26]

1) Islam is a religion of knowledge and science that does not limit the implementation of constructive scientific research. Thus, Islam supports genetic engineering.
2) Genetic engineering can be used in the prevention, treatment or eradication of disease. Genetic engineering should not use germline stem cells (e.g. premature fetal stem cells)
3) Genetic engineering should not be used for malicious or offensive purposes, or to cross genes merely for sporting or scientific curiosity.
4) Islam does not object to the use of genetic engineering in agriculture and animal husbandry, without ignoring recent voices that warn of possible harmful long-term effects on humans, animals, plants or the environment.

According to the Halal Food Council International, halal food means food that is permitted under Islamic Law and must meet the following requirements:

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[21]Sutarno, Rekayasa Genetika dan Perkembangan Bioteknologi di Bidang Peternanakan Proceding Biology education Conference, Vol. 3 No. 1, 2016, 24

[22] *Ibid..,* 61

[23] M. Qoim, Role of New Plant Breeding Thechnologies for Food Security and Sustainable Agricultural Development, Applied Economic Perspectives and Policy, 42(2) 2020, 129

[24]Hayun Durrotul faridah, Halalkah Bioteknologi Gimo Hasil Rekayasa Genetika ?, diakses pada10 Juli 2021 Universitas Air langga

[25]Gilang Dwi Pradipta, Implementasi Impor Produk Rekayasa Genetika dalam Cartagena Protocol di Indonesia, Skripsi, Universitas Islam Indonesia Yogyakarta, 76

[26]Muhammad Ilham Arrofiq, Rekayasa Genetika Tanaman Pangan Dalam Pandangan Islam, Ainul Yaqin" Universitas Islam Malang, 6-8

1) It must not consist of or contain anything that is considered unlawful under Islamic Law
2) It must not be prepared, processed, transported or stored using tools or facilities that are not free from anything that is unlawful according to Islamic law;
3) It should not, in its preparation, processing, transport or storage, come into direct contact with food that fails to meet the requirements set out in Islamic Law. Thus, the halal guidelines adopted by HFCI can be considered as an instrument for taking precautionary measures to ensure that genetically engineered products are produced in accordance with the law, since the conditions that must be met to comply with the halal guidelines include both raw materials and the production process.

Dr. Ir. Anton Apriantono MS (Minister of Agriculture for the 2004-2009 period) said that the government is responsible for regulating and supervising so that genetically engineered products can be ensured to be halal. The government provides guidelines that regulate the determination of whether or not biotechnology food products are halal. Therefore, the MUI issued a fatwa on this matter which is stated in the MUI Fatwa Number 35 of 2013 concerning Genetic Engineering and Its Products.

MUI Fatwa[27] regarding Genetic Engineering and its Products is issued with the following legal provisions:

1. Carrying out genetic engineering on animals, plants and microbes (microorganisms) is permissible, provided that:
   a) done for the benefit (beneficial);
   b) not harmful (does not cause harm), either to humans or the environment; and
   c) does not use genes or other parts derived from the human body.
2. Genetically engineered plants are halal and may be used, provided that:
   a) useful; and
   b) not harmful.
3. Genetically engineered products in food, medicine and cosmetics are halal on the following conditions:
   a) Beneficial
   b) not harmful; and
   c) The source of genes in genetically engineered products does not come from anything forbidden.

Istinbath (taking legal basis) This MUI halal fatwa is based on

a. The basic verses of the Qur'an used are:

QS. Al-Jatsiyah : 13

وَسَخَّرَ لَكُم مَّا فِى ٱلسَّمَـٰوَٰتِ وَمَا فِى ٱلْأَرْضِ جَمِيعًا مِّنْهُ ۚ إِنَّ فِى ذَٰلِكَ لَـَٔايَـٰتٍ لِّقَوْمٍ يَتَفَكَّرُون

Meaning: *"And He has subjected to you whatever is in the heavens and whatever is on earth, all (as mercy) from Him. Indeed, in that there are truly signs (of Allah's power) for a people who think."* (QS. al-Jatsiyah: 13)

1) QS. Al-An'am : 99

وَهُوَ ٱلَّذِىٓ أَنزَلَ مِنَ ٱلسَّمَآءِ مَآءً فَأَخْرَجْنَا بِهِۦ نَبَاتَ كُلِّ شَىْءٍ فَأَخْرَجْنَا مِنْهُ خَضِرًا نُّخْرِجُ مِنْهُ حَبًّا مُّتَرَاكِبًا وَمِنَ ٱلنَّخْلِ مِن طَلْعِهَا قِنْوَانٌ دَانِيَةٌ وَجَنَّـٰتٍ مِّنْ أَعْنَابٍ وَٱلزَّيْتُونَ وَٱلرُّمَّانَ مُشْتَبِهًا وَغَيْرَ مُتَشَـٰبِهٍ ۗ ٱنظُرُوٓا۟ إِلَىٰ ثَمَرِهِۦٓ إِذَآ أَثْمَرَ وَيَنْعِهِۦٓ ۚ إِنَّ فِى ذَٰلِكُمْ لَـَٔايَـٰتٍ لِّقَوْمٍ يُؤْمِنُون

Meaning: *"A green plant. We bring forth from it a mass of grain; and from the sheath of the date palm stalks hanging down, and gardens of grapes, and (We bring forth) olives and pomegranates, similar and dissimilar. Look at their fruits when they yield their fruit and (also look at) their ripeness. Indeed in that are signs for a people who believe."* (QS. Al-An'am[6]: 99)

2) Al-Imran : 190-191

ٱلَّذِينَ يَذْكُرُونَ ٱللَّهَ قِيَـٰمًا وَقُعُودًا وَعَلَىٰ جُنُوبِهِمْ وَيَتَفَكَّرُونَ فِى خَلْقِ ٱلسَّمَـٰوَٰتِ وَٱلْأَرْضِ رَبَّنَا مَا خَلَقْتَ هَـٰذَا بَـٰطِلًا سُبْحَـٰنَكَ فَقِنَا عَذَابَ ٱلنَّارِ إِنَّ فِى خَلْقِ ٱلسَّمَـٰوَٰتِ وَٱلْأَرْضِ وَٱخْتِلَـٰفِ ٱلَّيْلِ وَٱلنَّهَارِ لَـَٔايَـٰتٍ لِّأُو۟لِى ٱلْأَلْبَـٰبِ

[27] Fatwa Majelis Ulama Indoensia Nomor 35 Tahun 2013 Tentang Rekayasa Genetika dan Produknya

Meaning: *"Indeed, in the creation of the heavens and the earth, and the alternation of night and day, there are signs for people of understanding, (namely) those who remember Allah while standing or sitting or lying down and they think about the creation of the heavens and the earth (saying): "Our Lord, You did not create this in vain, Glory be to You, so protect us from the torment of hell."* (QS. Ali 'Imran [3]: 190-191).

b. Hadith of the Prophet Muhammad, among others:
   1) Hadith from Ibn Majah, al-Baihaqi, al-Hakim, at-Thabrani, and at-Tirmidhi.

قَالَ: سُئِلَ رَسُولُ اللهِ صَلَى اللهُ عَلَيْهِ وَسَلَمَ عَنْ الّسَمْنِ وَالْجُبْنِ فِي كِتَابِهِ وَالْحَرَامُ مَا حَرَمَ اللهُ فِي كِتَابِهِ، وَمَا عَنْ سَلْمَانَ الْفَارِسِيِ ماجه والبيهقي والحاكم والطبراني وَالْفِرَاءِ، قَالَ: "الْحَلَالُ مَا أَحَّلَ اللهُ سَ كتَ عَنْهُ فَ ُهوَ مِمَا عَفَا عَنْهُ" (رواه ابن والترمذي)

Meaning: "Salman al-Farisi said: Rasulullah SAW was asked about ghee, cheese and fur, he said: halal is what Allah has made lawful in His Book, haram is what He has forbidden in His Book, while what is not mentioned in both is permissible".

   2) Hadith narrated by Muslim, Ibn Khuzaimah, and Ibn Hibban

عن أنس رضي الله عنه أّن رسول الله صلى اهلل عليه وسلم مر بقوم يلقحوّن النّخّل فقال: لو لم تفعلوا لصلح، قال فّخرج شيصا" تمرا رديئا" فمر بهم فقال: ما فقال:لولم لنّخلكم؟ قالوا: قلت كذا وكذا.. قال أنتم أعلم بأمور دنياكم. (رواه مّسلم وابن خزيمة وابن حبآن)

Meaning: *"From Anas ra that the Messenger of Allah saw met a group of people who were doing date seeding and the Prophet saw said: "If you do not do (what you are doing now) perhaps the results will be better, and then (when harvesting) the dates come out with bad quality. The Prophet saw then met them again and asked: "How is the condition of your date harvest? The companions said this and that. The Messenger said: "You know more about your worldly affairs".*

   3) Hadith History of Ahmad, Malik, and Ibn Majah

عَنِ ابْنِ عَبَاسٍ قَالَ قَالَ رَسُولُ اللهِ صَلَى اللهُ عَلَيْهِ وَسَلَمَ: لَا ضَرَرَ وَلَا ضِرَارَ. (رواه أحمد ومالك وابن ماجه)

Meaning: *"From Ibn Abbas RA, he said: "The Messenger of Allah SAW said: You must not endanger/harm other people and you must not (also) repay danger (losses caused by other people) with danger (acts that harm them)."*

So, as long as genetically engineered products do not contain ingredients that are forbidden in Islamic law, then it is permissible to consume them. Because by consuming halal and thayyib (good) food, the human mind, soul, and body will always be maintained so that the acts of worship that are carried out can be optimal and accepted by Allah SWT. Conclusion and Suggestions Various transgenic plant products in Indonesia so far are products that are needed to meet daily living needs, besides this product has received permission from the government and is not free from its supervision. Even the Indonesian Ulema Council also allows the use of transgenic plant products, because the materials used do not violate religious law and are not made from forbidden materials, and the positive impacts outweigh the negative impacts. So it depends on whether the community wants to use transgenic plant products or not.

   4) Qaidah Fiqhiyyah

اَلْأَصْلُ فِي الْمَنَافِعِ اَلْإِبَاحَةُ

"The original law of something that is useful is that it is permissible/permissible"

أَلَصْلُ فيِ أَلْأَشْيَاءِ النَافِعَةِ أَلْإِبَاحُ ُة، وَفيِ أَلْأَشْيَاءِ الضَارَةِ الْحُرْمَ.

"The law as long as something is useful is permissible, and the law as long as something is harmful is haram.".

أَلَصَّلُ فِي ٱلْأَشْيَاءِ ٱلْإِبَاحَةُ، مَا لَمْ يَقُمْ دَلِيْلٌ مُعْتَبَرٌ عَلَى الْحُرْمَةِ.

"The original law regarding something is that it is permissible as long as there is no muktabar argument that forbids it".

الأمور بمقاصدها

"(Law) Everything depends on its purpose"

للوسائل حكم المقاصد

"The law on the means is the same as the law on the object it is aimed at"

الضرر يزل

"The danger must be eliminated"

Genetic Engineering of Food Crops PerspectiveThe al-Kuliyat al-Khamsah

1. Hifz Nafs

   Genetic engineering of plants can increase plant food production, thereby preventing starvation and malnutrition. Through genetic engineering of plants, it is possible to improve the nutritional quality of food by increasing the vitamin and mineral content, which helps to overcome the problem of malnutrition in some regions.[28] In addition, the use of plants that are resistant to pests and diseases can reduce dependence on chemical pesticides and herbicides, which has positive impacts on the environment and human health.

   Food security can also be improved because genetically modified plants can grow well in difficult environments, such as infertile soil or areas that often experience drought. Finally, we can create special plants that have certain characteristics, such as better taste or resistance to certain diseases, as well as better quality for food processing. All of this helps us obtain nutritious food more easily through genetic engineering technology..[29]

2. Hifz Mal

   Genetic engineering can increase agricultural productivity and reduce losses due to pests and diseases.

   Through genetic engineering in plants, several important benefits can be achieved. First, it can increase agricultural yields because genetically modified plants can grow better and are resistant to pests, diseases, and extreme weather conditions.[30]

   The increasing development of food technology makes the use of basic food ingredients or ingredients in processing food very diverse. The development of this food is trapped because of the need for ingredients with several desired properties at a low price. Providing a cheaper price but having good quality and having the ability to biotic and abiotic disorders. And also reducing costs to be cheaper and having a great influence on profits. Agricultural products that use genetic engineering techniques, the harvest produced becomes more, bigger and more durable, at a cheaper price than conventional agricultural products.[31]

   With such a solution, losses for farmers can be minimized, and of course, food crop farmers will gain more profits.

3. Hifz 'Aql

   Genetic engineering can produce food that is healthier and safer for consumption.

   In the legal context in Indonesia, genetic engineering in food is regulated by Law Number 18 of 2012 concerning Food. This law mandates the importance of food safety, creating quality food products, and protecting consumers' rights to obtain clear information about the products they consume.[32]

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[28]Siti Naila Nafasya Glen; Shafa Safira Azzahra, Pengaruh Teknologi Rekayasa Genetika Terhadap Keberlangsungan Hidup Manusia Ditinjau Dari Pandangan Agama Islam, Moderasi: Jurnal Kajian Islam Kontemporer (2023), 4

[29] Alisha Amare Putridischeva, et al, Pengaruh Tekonologi Rekayasa Genetika.., 6

[30]Siti Naila Nafasya Glen; Shafa Safira Azzahra, Pengaruh Teknologi Rekayasa Genetika Terhadap Keberlangsungan.., 4

[31] *Ibid.,* 8

[32]N. Abbas, Kontoversi Sekitar Produk Pangan Hasil Rekayasa Genetika, Jurnal Hukum 10(23),2003 , 169

The use of genetic engineering in agriculture is aimed at increasing production, quality, and durability of crops, while considering more affordable prices. However, problems arise regarding the labeling of food products containing genetic engineering to protect consumers' rights to information.[33]

In order to anticipate negative impacts, the Food and Drug Supervisory Agency (BPOM) has made regulations that require genetically engineered food products to pass safety tests according to applicable standards before they can be distributed in Indonesia. This is done to ensure the safety and quality of products for consumers.[34]

Genetic engineering of food has various types of advantages and disadvantages, which can vary depending on its implementation and the perspective used. Here are some examples of advantages and disadvantages that can occur.

4. Hifz Nasl

Genetically Engineered Food (GEM) Health Perspective is a topic that is still generally debated in society. The public has several concerns about GEM food products that are considered to have a negative impact on health. However, basically, there are studies and tests that serve as references to determine the safety and suitability of GEM food products. One issue that is often questioned is the potential allergenicity of GEM.[35]

Although the transfer of genes that cause allergies is undesirable in food, there are testing protocols that have been prepared and evaluated by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) to ensure that the gene-transferred proteins are not allergenic. To date, there are no known allergic effects in genetically engineered foods on the market. Another issue is the transfer of genes from PRG into the human body or bacteria in the digestive system.[36]

This raises concerns that the genetic material could be detrimental to human health, especially if antibiotic resistance genes are transferred. However, the chances of such transfer are very small. Experts from the FAO/WHO have recommended the use of technologies without antibiotic resistance genes to reduce this potential problem. Outcrossing, the transfer of genes from genetically engineered crops to conventional crops or related species in nature, is also a concern. Post-harvest mixing of genetically engineered and conventional crops can have implications for food safety and security. Several countries have adopted strategies to reduce the risk of mixing, including separating farmland for genetically engineered and conventional crops.[37]

In this context, in May 2000, the Cartagena Protocol on Biosafety was produced, which is the first regulation of the UN Convention on Biological Diversity. This protocol aims to provide rules to ensure the safe transfer, handling and use of organisms resulting from modern biotechnology that pose a risk to biodiversity and human health.[38]

In Indonesia itself, PP No. 28 of 2004 concerning Food Safety, Quality, and Nutrition has been issued. This regulation sets quality standards related to nutritional value and safety and requires every product to obtain certification from the Food and Drug Supervisory Agency (Badan POM).[39]

In conclusion, according to Herlina[40] health-related issues related to genetically engineered food require a careful and evidence-based approach. International protocols and regulations, such

[33]Annisa Larasati, Standarnisasi Keamanan Pangan Produk Rekayasa Genetika, Jurnal Plaza Hukum Indonesia Vol. 1 No. 1 2023, 18

[34]Abbas, Identifikasi dan Pengujian.., 58

[35]Hardiansyah, Handewi, Dewi ketut Sandra, Marhamah, Nur Riska, Pengetahuan dan Persepsi Masyarakat Tentang Produk Rekayasa genetika dan Implikasinya terhaadap Ketahanan Pangan dan Pertanian, 2007

[36]Siti Naila Nafasya Glen; Shafa Safira Azzahra. Universitas Pembangunan Jaya, Pengaruh Teknologi Rekayasa Genetika Terhadap Keberlangsungan Hidup Manusia Ditinjau Dari Pandangan Agama Islam, Moderasi: Jurnal Kajian Islam Kontemporer (2023), 10

[37] Alisha Amare Putridischeva, et al, Pengaruh Tekonologi Rekayasa Genetika.., 7

[38]L. Herlina, Pangan Rekayasa Genetika: Perspektif Kesehatan Hukum Negara dan Agama, Jurnal Pendidikan dan Sosial Budaya, Vol. 2. No.2 2022, 206

[39]*Ibid..,*

[40]*Ibid..,* 210

as the Cartagena Protocol on Biosafety, as well as national policies, such as PP No. 28 of 2004 in Indonesia, have been established to ensure the use of genetic engineering technology that is safe for the public and in accordance with applicable food safety standards .

5. Hifz Din
   a. Does genetic engineering lead to the misuse and exploitation of natural resources.

      The use of genetically modified (GM) crops has several important risks that need to be considered. First, there are environmental risks because GM crops can affect ecosystems and non-target organisms, and have the potential to cause cross-species contamination with wild plants [41.] Second, genetic engineering technology may make farmers more dependent on large corporations that control crop seeds and related technologies, resulting in greater dependence on large business entities.[42]

      In addition, there are health risks, such as allergic reactions and negative effects on the body associated with the use of genetically engineered products containing toxic substances. As a result, this can cause dangerous, unexpected, or unwanted changes in genes, as well as making the body more resistant to natural antimicrobials.

      These are all important considerations when using genetic engineering technology in agriculture. It is important to recognize that the benefits and risks of genetic engineering of food can vary depending on individual cases and implementation.

      These transgenic food products can cause growth retardation or reproductive failure in humans and can make someone immune to antibiotics. Genetically engineered products can also cause allergies for some sensitive people and can be dangerous to humans because there is a content in cow's milk that is injected with growth hormones containing chemicals.[43]

   b. Can genetic engineering conflict with the values of humanity and justice

      Perhaps some people understand that genetic engineering of food is permissible, while others may consider that this violates their religious principles[44]

      Islam has regulated food ingredients that can be eaten and cannot be eaten, or commonly called halal and haram use. In Indonesia, where the majority of the population is Muslim, it has regulated food products that have been circulating in the community, for example halal food, halal food is food that does not use ingredients that are prohibited for consumption by Muslims, both for raw food ingredients, food additives, auxiliary materials, and other auxiliary materials that are processed by genetic engineering or food irradiation procedures and their processing must be in accordance with the provisions of Islamic religious law.[45]

      Halal food products are products that meet the halal requirements according to Islamic law, the process of managing the use of Halal products has two interrelated elements, namely certification and labeling related to the safety of Muslim consumers both religiously and spiritually. and physically, when consuming a food product, the halal food product must have legal certainty of being halal or haram for consumption by Muslims.[46]

      In genetic engineering (biomolecular or recombinant DNA) the technique of isolating, purifying, inserting, and expressing specific genes in a host to express specific traits in an organism or to produce products in a non-natural way.[47]

      In carrying out the commands of Allah Subhanahu Wataala and the Messenger of Allah, followers of the Islamic religion must carry out various kinds of Shari'a that have been taught, including regarding food and drink.

      يَـٰٓأَيُّهَا ٱلَّذِينَ ءَامَنُواْ كُلُواْ مِن طَيِّبَـٰتِ مَا رَزَقْنَـٰكُمْ وَٱشْكُرُواْ لِلَّهِ إِن كُنتُمْ إِيَّاهُ تَعْبُدُونَ

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[41]*Ibid..,* 210

[42]Siti Naila Nafasya Glen; Shafa Safira Azzahra. Universitas Pembangunan Jaya, Pengaruh Teknologi Rekayasa Genetika Terhadap Keberlangsungan Hidup Manusia Ditinjau Dari Pandangan Agama Islam, Moderasi: Jurnal Kajian Islam Kontemporer (2023) 1:1, 1-25

[43]*Ibid..,* 15

[44]Arrofiq, Rekayasa Genetika Tanaman Pangan Dalam Pandangan Islam, Univ Islam Malang 2021

[45]Alisha Amare Putridischeva, et al, Pengaruh Tekonologi Rekayasa Genetika.., 8

[46]Mahrus, Kontroversi Produk Rekayasa Genetika yang dikonsumsi Masyarakat, Jurnal Biologi Tropis, 14(2) 2014, 1411

[47] *Ibid..,*

Meaning: *"O you who believe, eat of the good things We have given you and give thanks to Allah, if it is truly Him you worship"* (QS (Al-Baqarah: 172)

In Indonesia in particular, Muslims have an official religious institution, namely the Indonesian Ulema Council (MUI). Given that not all Muslims in the country understand Islamic law properly and correctly, including issues regarding food and drink, and moreover new things such as genetic engineering of food as a product of modern scientists[48]

Therefore, the MUI issued a fatwa regarding genetic engineering and its products on August 3, 2013, a decree was issued that determines the law on Genetic Engineering and its Products, that: Carrying out genetic engineering on animals, plants and microbes (microorganisms) is permissible, on the condition that: it is done for the good (beneficial), is not harmful (will not cause harm), it will have a good impact on humans and the environment, and does not use genes or other parts that come from humans.[49]

The fatwa was issued after hearing an explanation from the Biosafety Commission of Genetically Engineered Products, LPPOM MUI, Fatwa Number 3/Munas VI/MUI/2000 Concerning Cloning, and a discussion of the MUI Fatwa Commission Session. This fatwa is also based on the Qur'an, hadith, and Islamic jurisprudence[50]. Referring to the fatwa, it is sufficient for Muslims in Indonesia to know new products, processed products, or packaging that are classified as good and halal food by adhering to the halal certificates for raw materials and additional materials for their manufacture issued by the MUI based on the results of laboratory tests from the LPPOM MUI and the POM Agency. Plants/or food crops resulting from genetic engineering when they meet the following requirements: beneficial, not harmful, and not dangerous. Then the results of genetic engineering are considered halal and may be consumed, with the provisions; The food crop is included in the *Halaalan Thayyiban* category (halal and good), has benefits, and is not dangerous.

References

Angga Saputra, Kefas Panji Alexandrea, Izra Narendra, Raynaldi, Muhammad Fathin Raflianto, Julius,Rekayasa Genetika Menurut Sudut Pandang Agama Universitas Pembangunan Jaya Moderasi: Jurnal Kajian Islam Kontemporer (2023)

Dwi Andayani, Widyana Rahmatika, Nur Fitriayah, Tretno, Transformasi Genetik : Peluang dan Tantangan, Jurnal Ilmiah Agrineca, Vol. 23 No. 1 2023 Susilo

Hadi, Analsiis Potensi Budidaya Tanaman Transgenetik di Indonesia, Jurnal Environmental Vol. 2 No. 1 2019

Ilham Arrofiq, Muhammad, Rekayasa Genetika Tanaman Pangan Dalam Pandangan Islam, Ainul Yaqin" Universitas Islam Malang.

Bagus Nur Sudrajat, Nurhayati, Bambang Sugiharto, A., Keamanan Pangan Komoditas Transgenik: Studi Kasus Sediaan Pakan Hijauan Dari Daun Tebu Overekspresi SoSPS1, Agrointek Volume 15 No 3 September 2021.

Barros, E Lezar, S Anttonen, M.J. VanDijk, J.P. Rohlig, R.M. Kok, E.J., 2010, Comparison of two GM Maize VarietesWWith A Near-isogenik Non-GM Variety Using Transciptornisc, Proteomics and Metabolomixs. Plant Biotecnology Journal 8, 436

Sidhu, Ridley, Nemeth, Breeze, Astwood, Comparasion of The Nutritional Profile of Glyphosate-tolerant Corn Event NK603 With That ofConventional Corn (*Zea Mays L.*) Jurnal of Agricultural and Food Chemistry.

[48]L. Herlina, Pangan Rekayasa Genetika.., 208

[49]Fatwa Majelis Ulama Indoensia Nomor 35 Tahun 2013 Tentang Rekayasa Genetika dan Produknya

[50]L. Herlina, Pangan Rekayasa Genetika.., 208

Tando, Muh. Afif Juradi, Edi, Upaya Peningkatan Kualitas Tanaman Kedelai (Glycine Max L. Merill) Melalui Pemanfaatan Bioteknologi Dalam Mengatasi Kelangkaan Pangan (Efforts to Improve Quality of Soybean Plant (Glycine max L. Merill) Through the use of Biotechnology in Overcoming Food Scarcity), Jurnal Agrotek Vol. 3 No. 2 September 2019

Hadiarto, T.U Tri Indraini, R.P Saptowo J, M. Herman. 2002,. Analisis Molekuler Gen *PinII* pada tanaman kedelai Transgenetik R2, Prosiding Seminar hasil penelitian rintisan dan bioteknologi tanaman, 133

Yutono, Inokulasi *Rhizobium* pada kedelai, Di Dalam: Somaatmadja *et al*, *Kedelai*, Balai penelitian dan pengembanngan pertanian, Bogor: Puslitbangtan, 1985

Susilawat, R, Desain Primer Spesifik untuk Mengaplikasi Sekuensi Gen *CFL* (*Coronafacate Ligase*) pada pathogen hawar Bakteri yang menginfeksi Kedelai. Skripsi Fak Pertanian Univ Jamber, 2013.

Webb, K.J., Morris, P. Methodologies of Plant Transformation, In : Gatehouse, Hilder et al, *Plant Genetic Manipulation for Crop Protection*, C A B International United Kingdom.

Hinchee, M.A.W. D.V. Connor ward, C.A. Newell, R.E. Mc Donnel, S.J. Sato, C.S. Gasser, D.A. Fischoff, Fraley, Hoscht, Production of transfgenetic Soybean Plants Using Agrobacterium Mediated DNA Transfer. Bio Tech, 6, 915

Agustin, M. *Permasalahan belajar dan inovasi pembelajaran*, (Bandung: Refika Aditama, 2011)

Devi Artanti, Hardinsyah, Dewi Ketut Sandra Swastika, Retnaningsih, Guspri, Analisis Faktor-faktor yang mempengaruhi Penerimaan Petani Terhadap Produk Rekayasa Genetika, Jurnal Gizi dan Pangan Vol.5 No. 2, 2010.

Suwardike, Putu, Quo Vadis Pangan Produk Rekayasa Genetik di Indonesia, Agro Bali (Agricultural Jurnal) Vol. 2, No. 1, 2019.

Qoim, M., Role of New Plant Breeding Thechnologies for Food Security and Sustainable Agricultural Development, Applied Economic Perspectives and Policy, 42(2) 2020, 129

Pramashinta, Riska, Hadiyanto, Bioteknologi Pangan : Sejarah manfaat dan Potensi Resiko, Review Jurnnal Aplikasi Teknologi Pangan, Vol. 3 No. 1, 2014.

Naila Nafasya Glen; Shafa Safira Azzahra, Siti, Pengaruh Teknologi Rekayasa Genetika Terhadap Keberlangsungan Hidup Manusia Ditinjau Dari Pandangan Agama Islam, Moderasi: Jurnal Kajian Islam Kontemporer, Vol. 1 No. 1 2023.

Sutarno, Rekayasa Genetika dan Perkembangan Bioteknologi di Bidang Peternanakan Proceding Biology education Conference, Vol. 3 No. 1, 2016

Prianto, Swara Yudhasasmita, Yuwono, anaman Genetically Modified Organism (GMO) Dan Perspektif Hukumnya Di Indonesia, Al-Kauniyah: Jurnal Biologi, Vol. 10, No. 2 2017

Seprianto, Modul Matakuliah Bioteknologi Dasar (IBD 121), 2017, 1–102. 3 Dyah Ochtorina Susanti, Hukum Bioteknologi (I) Perlindungan Hukum Terhadap Bioteknologi Bidang Pertanian Dan Kesehatan: Perspektif HAKI Dan Lingkungan. (Yogyakarta: Laksbang Justitia, 2019)

Estiati and M. Herman, Amy, Regulasi Keamanan Hayati Produk Rekayasa Genetik Di Indonesia, Analisis Kebijakan Pertanian 13, no. 2 (2016) Abu Zahrah, Muhammad. Ushul al-Fiqh. Mesir: Dar al-Fikr al-'Arabi, 1958.

Sulaeman, Signifikansi Maqashid Al-Syari'ah Dalam Hukum Ekonomi Islam, Jurnal Syari'ah dan Hukum Diktum, Vol. 16, No. 1 Juli 2018

Dona Pertiwi, Sri Herianingrum, Tanza, Menggali Konsep Maqashid Syariah: Perspektif Pemikiran Tokoh Islam, Jurnal Ilmiah Ekonomi Islam, Vol. 10 No.1, 2024

S. Ningsih, C., Comparison of Al-Syatibi and Thahir Ibn Asyria's Thoughts on Maqashid Shari'ah. Jurnal Ilmiah Mizani: Wacana Hukum, Ekonomi, dan Keagamaan, Vol.. 8 No. 1 2021.

Kasdi, Abdurrahman, Maqasyid Syariah dan Hak Asasi Manusia, Jurnal Penelitian Vol.8 No. 2 Agustus 2019.

Durrotul faridah, Hayun, Halalkah Bioteknologi Gimo Hasil Rekayasa Genetika ?, diakses pada10 Juli 2021 Universitas Air langga

Dwi Pradipta, Gilang, Implementasi Impor Produk Rekayasa Genetika dalam Cartagena Protocol di Indonesia, Skripsi, Universitas Islam Indonesia Yogyakarta

Ilham Arrofiq, Muhammad, Rekayasa Genetika Tanaman Pangan Dalam Pandangan Islam, Ainul Yaqin" Universitas Islam Malang.

Fatwa Majelis Ulama Indoensia Nomor 35 Tahun 2013 Tentang Rekayasa Genetika dan Produknya.

Naila Nafasya Glen, Shafa Safira Azzahra, Siti, Pengaruh Teknologi Rekayasa Genetika Terhadap Keberlangsungan Hidup Manusia Ditinjau Dari Pandangan Agama Islam, Moderasi: Jurnal Kajian Islam Kontemporer (2023).

Abbas, N., Kontoversi Sekitar Produk Pangan Hasil Rekayasa Genetika, Jurnal Hukum 10(23) 2003.

Larasati, Annisa, Standarnisasi Keamanan Pangan Produk Rekayasa Genetika, Jurnal Plaza Hukum Indonesia Vol. 1 No. 1 2023.

Hardiansyah, Handewi, Dewi ketut Sandra, Marhamah, Nur Riska, Pengetahuan dan Persepsi Masyarakat Tentang Produk Rekayasa genetika dan Implikasinya terhaadap Ketahanan Pangan dan Pertanian, 2007

Herlina, L., Pangan Rekayasa Genetika: Perspektif Kesehatan Hukum Negara dan Agama, Jurnal Pendidikan dan Sosial Budaya, Vol. 2. No.2 2022.

Rachmawati, Taupik Sopyan, Jeli, Potensi Tanaman Trasngenetik Sebagai Salah Satu Teknologi dalam Pengelolaan Hama Terpadu, Bioed: Jurnal Pendidikan Biologi Vol. 11 No. 2023

Arrofiq, Rekayasa Genetika Tanaman Pangan Dalam Pandangan Islam, Univ Islam Malang 2021

Mahrus, Kontroversi Produk Rekayasa Genetika yang dikonsumsi Masyarakat, Jurnal Biologi Tropis, 14(2) 2014.