Preface: Proceedings of the 2nd International Conference on Bioscience, Biotechnology, and Biometrics 2019 (ICBBB2019)

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All Praises to God Almighty for giving us the health, welfare, and opportunity so that we all can meet in **The 2nd International Conference on Bioscience, Biotechnology and Biometrics** (ICBBB) 2019". This meeting is hosted by Lab of Bioscience and Biotechnology Research, University of Mataram, Indonesia which is supported and funded by the Indonesia Ministry of Higher Education and Research (KEMENRISTEK-DIKTI). It is held for two days, from 13th to 14th August 2019 in Aruna Resort and Convention, Senggigi, Lombok.

In this international forum, we are glad to welcome speakers from various universities/ institutions in Indonesia and also other countries such as New Zealand, Japan, Germany, UK, and Malaysia. We hope this event could provide insights on our future research and development of Indonesia in the field of Bioscience, Biotechnology and Biometrics. The papers in this proceeding has been selected and grouped based on the similarity in the research field which are, agriculture, bioscience, health and food science.

The organizing committee would like to express our gratitude to all of you for your participation on this conference, especially to the all keynote speakers, presenters who have submitted for both oral and posters presentations and also to all participants. Our special gratitude also goes to the Rector of Mataram University, Fukushima Medical University Japan, University of Malaya Malaysia, Massey University New Zealand, Third Institute of Oceanography China, Universitas Gajah Mada, Indonesia University and Malaysia Science Academic who have been highly supporting this conference. Critics and suggestions on the implementation of this conference will be appreciated and as much as possible we will improve the next ICBBB. We also would like to thank the all of you who have supported this conference. Also, the whole committee of ICBBB2019, without of all you this event would not be possible. Last but not least, we are thankful for the enormous support of AIP conference for supporting us in every step.

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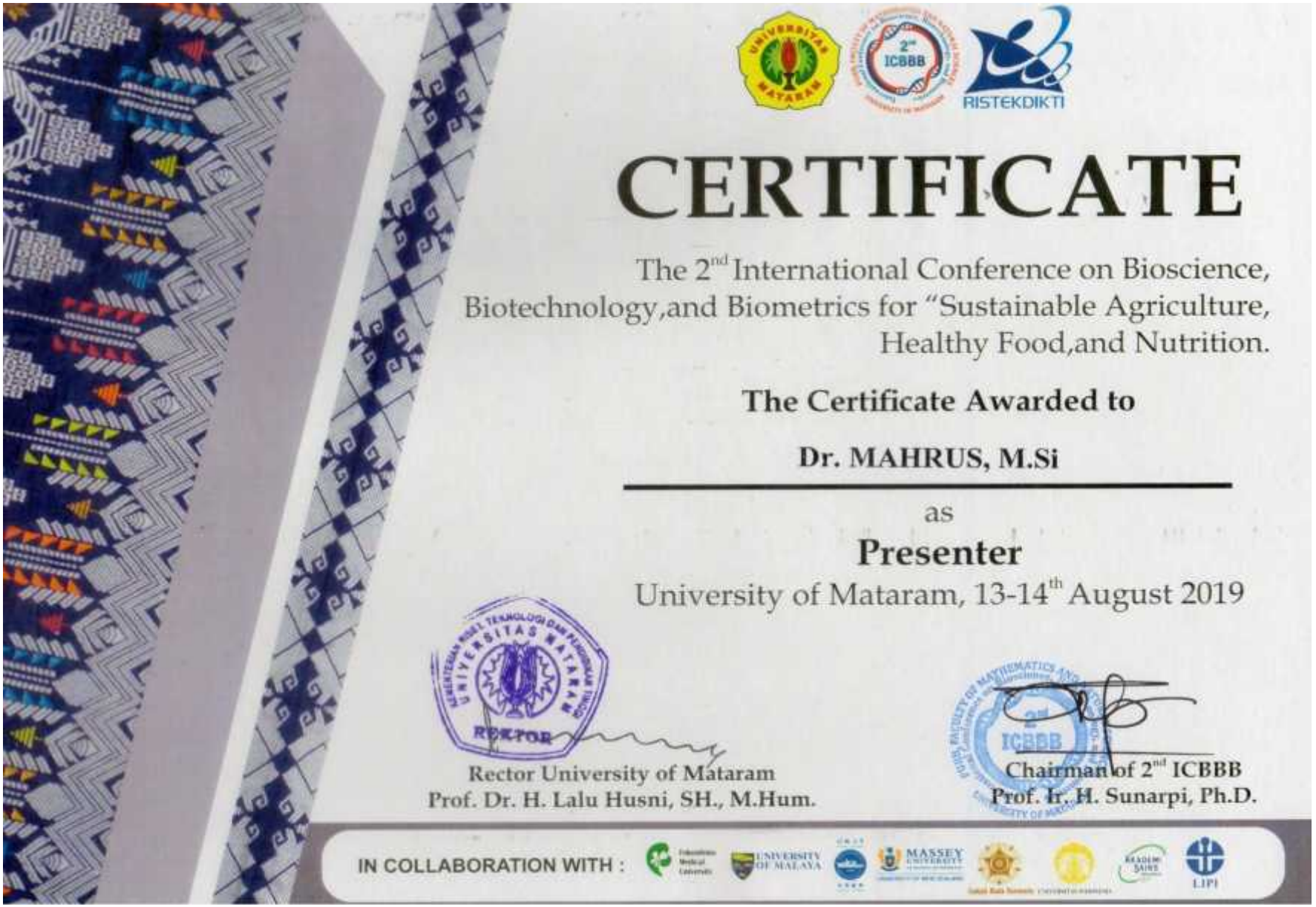

CERTIFICATE

The 2nd International Conference on Bioscience, Biotechnology,and Biometrics for "Sustainable Agriculture, Healthy Food,and Nutrition.

The Certificate Awarded to

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Presenter

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Genetically engineered food products threaten human health: A comprehensive research needed

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Genetically Engineered Food Products Threaten Human Health: A Comprehensive Research Needed

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Abstract. The presence of genetically engineered food (GEF) products commonly called genetically changed organism products has the goal to overcome the world food crisis. However, the products being controversy about some countries. They argue that these GEF products can endanger the health of consumers. This paper aims to discuss are GEF products threat human health. GEF products are organisms have undergone genetic modification using DNA recombining or genetic engineering technology. Many foods are genetically changed whole foods or contain ingredients derived from gene modification technology. The basic principle of genetic engineering technology is to manipulate the composition of DNA or to insert new genes into the structure of the recipient's DNA. It means that the scientists inserted genes into the recipient's living creatures can come from other living things. They still nowadays see those threats as a small trace is not to worry about them. People assumed that GEF products into threats living things, especially human beings. Even though, it is excessive emotional worry according to a scientific point of view because the event is very unlikely occurred. It recognized that any product has certain weaknesses for its advantages. Hence, it suggested that it's better to be careful with GEF products to be consumed.

INTRODUCTION

The international community is currently facing problems with hunger and malnutrition. This problem is very complicated caused by many factors, including limited food numbers, uncertain climate, and political conditions. Various methods are used to overcome the tragedy of hunger, one way is genetic engineering food (GEF) or Genetically Modified Organism (GMO). GEF is food produced from plants or animals whose DNA has been altered through genetic engineering is often called GMOs for short [1,2].

The development of GEF today is very rapid and encouraging because of attention from the government and scientists seriously to increase the people's welfare [3,4,5,6]. Genetic engineering is a technique used to manipulate the genetic components of a genome's DNA or genes on living things from the same living thing or a different type [1,7,8,9,10,11]. Living creatures whose genetic material has been artificially manipulated in the laboratory through genetic engineering are called transgenic living things that have superior properties compared to their native creatures [12,13].

The main aim of GEF is to overcome various problems of food shortage that cannot be solved conventionally [6,9,11,13, 14]. However, in its development to date, it still causes pro-controversy in the world community, both those that occur in countries where GMOs are developed and in countries that use GEF products. A very sharp controversy took place among scientists, each group surviving on reasons that could be accepted scientifically [5,6,11,15,16].

Pro GEF groups argue that there is unlimited potential in genetic engineering useful for reducing pesticide use, overcoming food shortages, and producing more nutritious foods and medicines. However, they reject the group stated that food products and medicines are not believed to be safe for consumption because they still harm health. Another negative effect for farmers is that it is detrimental to them because non-GEF farmers cannot increase productivity more profitable [17]. A negative impact to date has received less attention from the government and scientists as reported by [5]. Argentina is the second-largest country in the world that develops GEF plants which are supported by four main factors, namely [16]: political support; ability to solve farmers' needs; economic and environmental factors; and implementation of applicable laws and regulations. Domestic food products that exist could not overcome the problem of food shortages, and this has become a challenge for agricultural development in Indonesia [18].

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GEF has been on the Unites State market since 1994 ever since introducing FlavrSavr tomatoes that had been engineered to ripen more slowly [2]. Indonesia has produced GEF since 1999, but it still imports 10 basic ingredients from various countries that are suspected of being genetically engineered, namely: rice, corn, soybeans, wheat germ, wheat flour, granulated sugar, beef, chicken, salt, cassava and potatoes [19]. Besides, imported fruits in supermarkets are GEF products, but unfortunately, they are on the Indonesian market not labeled Genetically Modified (GM). Genetically changed plants have the potential to eliminate hunger, especially in developing countries because they can produce foods that are more superior, such as pest resistant and drought. They also contain large amounts of nutrients such as proteins and vitamins. However, there is some controversy regarding the benefits and risks [20].

The material discussed focuses on the potential impact of GEF products on human health in this paper. But, it is very important to explain GEF products and their problems, the impact of GEF products on human health, and the regulation for the use of GEF products in Indonesia. An overview of the literature shows that genetically changed plants available on the market are safe for human consumption and is not related to serious health problems. However, because of the large GEF needs for the human population, so integrated research is needed in the long-term to ensure that they are safe.

MATERIALS AND METHODS

Methods used in writing this paper is a literature review. It does not only mean reading the literature but rather towards an in-depth and critical evaluation of previous research on a topic [21]. The stages in writing this paper are as follows: (1) collecting kinds of literature focus on GEF products threaten human health. The literature is divided into two groups, i.e. pro and contrary to GEF. A good literature review is an evaluation of the quality and new findings of a scientific paper from the Scientific Journal, the Conference (Proceedings), Thesis and Dissertation Reports, and Textbook book from trusted organizations; (2) summarizes, analyzes and synthesizes critically and in-depth from the papers that are reviewed. The results of the summary, analysis, synthesis, and then write it in the form of scientific papers.

RESULTS AND DISCUSSION

GEF products and their problems

Based on the explanation of the Food and Drug Supervisory Board of the Republic of Indonesia in the year 2017, GEF products include processed food products, food, and raw materials, food additives, and/or other ingredients produced from genetic engineering processes. However, the use of GM foods invites concern that these foods may cause risks to human health, including allergies, gene transfer, and cause disease cancer, AIDS and flu. Therefore, the possibility of risk raising needs to be minimized through an assessment carried out by the precautionary approach. Genetic engineering is an alternative technique for changing genetic material in a living creature.

Genetically engineered (GE) foods are developed by modifying DNA in some way. GE foods are also referred to as transgenic foods and genetically modified organisms (GMOs).There are several terms used to clarify genetic engineering including GMOs; genetic modification genetically modified; DNA technology; gene cloning or molecular cloning is a term that includes several techniques/methods/ procedures used to identify, imitate, change and transfer genetic material from cells, tissues or complete living things from one living creature to another [9,22,23]. The most widely used technology is DNA's recombine, a method used to manipulate certain DNA genes. This technique involves the ability to isolate, to cut and to move certain pieces of target DNA genes [9,24]. Manipulating DNA in various ways can produce various substances such as enzymes, monoclonal antibodies, nutrients, hormones, and various pharmaceutical products including large quantities of drugs and vaccines [25,26,27].GEF products have provided many benefits to human life, although they are also aware that they harm them of not considered trivial. Current field facts are very rare or suspected that there have been no reported negative impacts of using GEF products. There has been an incident recently in Indonesia on apples imported from the United States that have found several bacteria that are very dangerous for consumers' health based on a laboratory test.

One of the main problems in genetic engineering is whether genes inserted in a living creature will be inherited or not inherited from one generation to the next? Although the use of GEF technology is recognized as having the ability to produce large industrial products such as commercial pharmaceuticals, it still leaves concerns. Most of the effects of genetic engineering that can change the physical properties of living things are unknown [28].Not always gene transfer can be done by engineering certain genes in certain living things through recombining DNA techniques to produce various desired substances. [29] reported new genetic material may not be successfully transferred to the target cell. They are caused by some factors, such as the genes may be moved to the wrong place, new genes may accidentally activate a nearby gene usually inactive. This phenomenon can cause unexpected mutations making the plants are toxic, fertile, or not desired causing damage to plants natural. Besides, genetically engineered plants have the potential to damage the balance of the surrounding environment. Plant pests and diseases will run into conventional fields so that inevitably these farmers have to switch to using transgenic plants which are relatively expensive. Environmentalists worry that GMO crops will pose environmental risks when they are widely cultivated [30].

Cropping patterns of agricultural products in Indonesia are carried out in small areas surrounded by various weeds disturbing plants. Naturally cross-GEF plants pollination fearing will cause more resistant to herbicides, killing other living which causes the extinction of certain organisms. In the long-term, this GEF plant will change the structure and texture of the soil which will influence the quantity and quality of crop production [31]. Preliminary research reported that GEF plants have herbicides and resistance insects that can cross-pollinate with wild species producing certain substances that can eradicate weeds especially in small agricultural areas surrounded by wild plants [32]. On the other hand, GEF plants that can become weeds certainly require using a chemical that is expensive and endangers the environment to control them [33]. The possibility of the emergence of new viruses and poisons in transgenic plants is part of a strategy to increase crop resilience as was done in India [29,34]. On the other hand, the commercialization of GEF crops has gained international support with the risk various [29, 35,36,37]. It is different from the European community attitudes agreed to the use of GEF products although still cause conflicts, both between departments, between sectors, between countries and between international institutions [37].

The impact of GEF products on human health

Various food products from time to time continue to emerge to improve public health, although many concerns about the negative impact that arise. Recently, the information related to the effects of changes in GMO nutritional components such as nutrient interactions, gene interactions, nutrient metabolism, gene expression, etc. is very little. [38] reported consumers worldwide are displaying limited understanding, misconceptions, and even unfamiliarity with GEF products because they receive much information about them from the media, the Internet, and other news sources. These sources may be less reliable than scientific experts whom consumers trust more to present the facts. The impact of this limited information, consumer awareness of current GEF labeling is low. The people who have higher scientific knowledge scores tend to have less negative attitudes toward GEF. Based on this information, it is suspected that there has not been one study that guarantees that the GEF product is safe for consumption.

GEF is thought to be the cause of diseases with the assumption that the entry foreign genes are thought to be the cause's diseases with the assumption foreign genes might alter the nutritional value of food in unexpected ways. Factors that need to be considered from the lack of information is that the use of food products from the GEF must be careful. Another concern is that antibiotic resistance into plants consumed is possible to have negative effects on human health that consume these plants [29].

In the body of transgenic living creatures, it allows antibiotic-resistant marker genes to be inserted into certain plants and can be transferred to disease-causing microbes in the intestines of humans or animals that consume food from GEF products. This phenomenon can result in microbes being resistant to antibiotics in living creatures, and subsequently contributing to antibiotic-resistant human health problems [32,39]. Also, many GEF products using microorganisms as potential donors cause allergies that are unknown or untested. Genes from non-food sources and new gene combinations can trigger allergic reactions in some people who consume them or worsen existing ones. [40] reported that Brazil nuts as one of the GEF products were withdrawn from circulation because they caused allergies to consumers. These allergic reactions are thought to be caused by the modification of certain genes. The movement to reject GEF continues to occur in various countries in the world. An example of a natural food campaign in the USA campaigning food risks such as loss of nutrients, the emergence of new poisons, allergy, and other side effects [41, 42].

The regulation for the use of GEF products in Indonesia

Indonesia as one of the countries that use GEF a lot must careful because until now there has been no reported negative impact from the use of GEF. In the future, the precautionary principle of the use of imported GEF must be put forward therefore, the role of the government and scientists is very much awaited. [43] informed that Genetic Engineering Products in the field of Food Security has explained GEF products are safe for consumption. From 2008 to 2016, the Team has reviewed food safety from 20 genetically engineered plants which are foods safe and safe for consumption. The assessment was carried out based on toxicity test data, allergens, nutrient composition analysis, anti-nutrition, minerals, vitamins, etc., and genetic information including gene sources, the composition of genetic elements and genetic stability.

Based on the regulation and law of Indonesia, nothing to worry about GEF products because of already legislation that regulates the use of GEF starting from the constitution, presidential and ministerial regulations. [44] reported that GEF plants require labels if they pose several identified threats such as allergic reactions or cause dramatic changes in nutrient content. Labeling is very necessary to ensure that GEF products are safe for consumption by the community [16,45].

[15] asserts that the inclusion of halal labels on the packaging of a food product is a must according to the Food Law. In the implementation of GEF products that are contrary to the law are certain to get rejection. [6] reported that Malaysian Muslim communities rejected the transfer of animal genes to plants, nevertheless, they do not explicitly allow GEF for their benefit. If all legal instruments regulating the use of GEF products in Indonesia implemented correctly, the threat concern of GEF products to human health and the environment will not happen. In addition, [15] also explained that the use of genetic engineering products in Indonesia must refer to several laws and regulations, including: (1) Law No. 7/1996 concerning Food; (2) Law No. 21/2004 concerning the Cartagena Protocol; (3) PP No. 69/1999 concerning Food Labels and Ads; (4) PP No. 28/2004 concerning Food Safety, Quality and Nutrition; (5) PP No. 21/2005 concerning safety of Genetically Engineered Products; (6) Regulation of the Head of the Indonesian POM Agency Number: HK.00.05.23.3541 of 2008 concerning Guidelines for the Assessment of Food Safety for Genetically Engineered Products; and others.

The legal instruments indeed regulate the circulation and the use of GEF is numerous and adequate, except that their implementation has not been maximized. One example reported by [15] the inclusion of halal information on packaging or labels of a halal food product is a necessity because of the Food Law. It means that these provisions are imperative. The facts are precisely the opposite of many food products that circulate to include the halal word on packaging. The producer has in this case never asked for halal certificates to the Indonesian *Ulama Council*. The society indeed knew that food producers do not have to include their halal certificate numbers, making it difficult for government supervision.

Malaysia as one of the neighboring countries, for example, is moving rapidly in reducing the concerns of the Muslim community on all GEF products as reported by [6]. The authorities of Islam religious and scientists should issue clear guidance on the halal status of various types of GEF products. The Food and Drug Supervisory Agency responsible for the use of GEF products including clear ethical guidelines and their dissemination to the public. The concern of the threat of GEF products to human health and other aspects will not seem if the regulation applied correctly. However, the problem is not as simple as that, was whether the positive law can prove such freedom among the various interests, and it is being a dilemma. It is very interesting to check them, on the one hand, it is paying tribute to the efforts to develop science and technology. However, on the other hand, one must also consider the ethical values, social, religious and legal standing [46].

CONCLUSION

This paper's discussion concludes that food products from genetically engineered genetic engineering have enormous potential, especially in overcoming the food shortages of the world's population, although they still pose a suspicion of threats to human health and the environment in the long run. To anticipate and minimize the threat, deep and independent integrated research is needed, especially those related to toxicity testing, allergens, nutrient composition analysis, anti-nutrition, minerals, vitamins, genetic information including gene sources, the composition of genetic elements and genetic stability. The results review can be used as rational considerations to make laws to protect consumers not only from the dangers that occur, the use of GEF products and supporting technologies.

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