REGULATORY POLICIES ON GENETICALLY MODIFIED PLANTS IN INDONESIA

Amar Ma'ruf*
University of Asahan, Indonesia
**Corresponding author: amarsanis92@gmail.com*

Abstract. In 2005, an estimated acreage of genetically modified plant (GMP) is 90 million hectares compared to 81 million hectares in 2004. The GMP is to be done along with the increasing human needs. With permission for GMP), which means that the task for scientists to continue to develop research to determine which GM products are allowed or not allowed.Also the participation of national and international government to create comprehensive regulation to regulate the use of GMP. GMP has several benefits for the cultivation of plants among other abiotic stress resistance, disease resistance, resistance to pests and maintain the quality of the plants.The Indonesian government has made regulations regarding GMP, through the Indonesian Government Regulation (*Peraturan Pemerintah Republik Indonesia*) No. 21 of 2005 on the biological safety of genetically modified products. In addition to government regulations, there are also other institutions that make the rules on GMP. As Indonesian Ulema Council (*Majelis Ulama Indonesia*) through the Indonesian Ulema Council Fatwa No. 35 of 2013 on genetic modified.

Keywords: modified, genetic, regulation

INTRODUCTION

In 2005, an estimated acreage of genetically modified plants (GMP) is 90 million hectares compared to 81 million hectares in 2004. For example, transgenic maize cultivated area of 21.2 million hectares of the world, or the equivalent of 14% of the total area of maize throughout the world, which is 145 million hectares (James, 2005). Security GMP plants used in agriculture as food and feed production is ensured by a comprehensive regulatory process. Marking of the genetic modification in plants and their products in the market do not show specific risks compared with conventional plants.For example, in the European Union, For consumer information, products containing genetically modified organisms (GMO) were given certification.

Although the existing regulations governing the GMP and certification agencies, but there are still many differences of opinion. Some have claimed that GMP may do. While the other states that GMP could endanger the survival of modified organisms and humans as consumers. In Indonesia,The Indonesian government has made regulations regarding GMP, through the Indonesian Government Regulation (*Peraturan Pemerintah Republik Indonesia*) No. 21 of 2005 on the biological safety of genetically modified products. In addition to government regulations, there are also other institutions that make the rules on GMP. Indonesian Ulema Council (MUI) through the Indonesian Ulema Council Fatwa No. 35 of 2013 on genetic modified and genetically modified products have been allowed, with the terms specified. GMP is to be done along with the increasing human needs. With permission for GMP, which means that the task for scientists to continue to develop research to determine which GM products are allowed or not allowed.Also the participation of national and international government to set a comprehensive regulation for the benefit of GMP.Various studies literacy in this paper is approved does GMP. This paper be turned into

an addition to the reference to the benefit of GM, as well as discuss regulations regarding permissible GMP.

DISCUSSION

In the early stages of the introduction of recombinant DNA technology in modern plant breeding and biotechnology in food production systems, ranging internationally defined evaluation strategies for safety of foods derived from genetically modified organisms (GMO).

Two years after the first successful trial of GM crops (tobacco) in 1988, the International Food Biotechnology Council (IFBC) published its first report related issue is the safety assessment of new varieties (IFBC, 1990).

Other organizations, such as the Organization for Economic Cooperation and Development (OECD), the Food and Agriculture Organization of the UN (FAO) and World Health Organization (WHO) and the International Life Sciences Institute (ILSI) has developed further guidance for the safety assessment that has been obtained broad international consensus among experts evaluation of food safety.

FOOD SAFETY EVALUATION OF GM PRODUCTS

Examples of food study results contained in case of Bt GM tomatoes to feed the rats experiments, and eaten for 91 days. Daily intake of the average is around 200 g tomatoes day^{-1} for each rat, content of tomatoes chosen because there are potassium relatively high ($40 \pm kg\ 60g \pm 1$), but higher amounts may cause renal toxicity (Noteborn and Kuiper, 1994). Experiments by Ewen and Pusztai (1999) reported that rats fed transgenic potatoes containing GNA lectin showed proliferative and anti proliferative properties effectsin intestine. This effect is suspected due to changes in the composition of the transgenic potatoes.

In addition to food studies described above, studies have been performed on domestic animals who eat food from GM crops to improve its activity. It is clear, that there is no harmony designexists on pet food trial to test the safety of GM foods.

GMP BENEFITS FOR PLANTS

GMP can produce benefits for the plant. In this discussion demonstrated several benefits of GMP ornamental plants, as follows:

Abiotic Stress Resistance

For the farmers and consumers of ornamental plants, light intensity, humidity and frost have an impact on the ability to produce valuable products on schedule. Research on GMP to increase resistance to abiotic stresses being explored for Ornamental Plant pot by Biosciences (Stuttgart, Germany) (Potera, 2007), using a gene known to be involved in drought tolerance. Tolerance to the ice in Petunia may increase gene transfer CBF3 *Arabidopsis thaliana* (Warner, 2011) and this will potentially increase the abiotic stress resistance in an environment where these plants can be planted.

Resistance to Pests and Disease

Fungi, bacteria, and virus pathogens can have damaging effects on ornamental plants during production, storage, distribution and end use by consumers. Some ornamental

plants have no or very low natural immunity against several common pathogens that are often found in the production and distribution process. Maintenance through chemical treatment of course the cost is high for producers or for consumers and home gardeners.GMP may be a solution. The study by Kim *et al.* (2011), caffeine-producing transgenic *Dendranthema grandiflorum* (Chrysanthemum) shown to provide resistance to pathogens. This GMP product is modified to produce caffeine also show resistance to the ticks.

Maintain Quality Plants

Survival of plants can be obtained by recognizing the resistance to ethylene or inhibition of endogenousexpression genes of ethylene biosynthesis. The introduction of ethylene receptor gene is mutated also decreased ethylene sensitivity in *Oncidium spp*. and *Odontoglossum spp.* (Raffeiner*et al.,* 2009). GMP technology can also inhibit senescence leaves, as shown in *D. grandiflorum* (Satoh *et al.,* 2008). In petunia plants modified with genes etr1-1, its senescence to be delayed. (Gubrium*et al.,* 2000).

REGULATORY ON GMP

The Indonesian Government has made rules on GM, through the Indonesian Government Regulation(*Peraturan Pemerintah Republik Indonesia*) No. 21 of 2005 on the biological safety of genetically modified products. This Government Regulation is intended to achieve environmental safety, food safety and / or safety of GM food products as well as their use in agriculture, fisheries, forestry, industry, environment, and non-pharmaceutical health. This Government Regulation aims to increase the effectiveness and efficiency of GM for the welfare of the people based on the principles of health and management of biological resources, consumer protection, legal certainty and certainty in doing business.

In addition to government regulations, there are also other institutions that make the rules on GMP. Indonesian Ulema Council (MUI) through the Indonesian Ulema Council Fatwa No. 35 of 2013 on genetic modified and genetically modified products have been allowed, with the terms specified.Genetically modify animals, plants and microbes (microorganisms) is permissible (allowed), with the proviso: do for the benefit, not harm either humans or the environment, and do not use genes or other part that comes from the human body.GM plants is lawful and may be used, provided that: helpful and not harmful. GM animals is lawful, provided that: the animal is included in the category *ma'kul al-lahm* (types of animals whose meat is halal consumed), beneficial, and not harmful. Product GM for food products, pharmaceuticals, and cosmetics are lawful provided that: helpful, not harmful, and the source of the genes in genetically modified products not derived from the unlawful.

CONCLUSION

1. GM has several benefits for the plant among other abiotic stress resistance, disease resistance,pests resistance, maintain the quality of the crop.
2. The Indonesian government has made regulations on GM, through the Indonesian Government Regulation No. 21 of 2005 on the biological safety of GM products.
3. Indonesian Ulema Council has attempted to make a fatwa that permits (permissible) GM in plants with beneficial terms and do no harm.

4. Based on the rules allow GM, the role of experts in plant breeding, microbiology, as well as in others that relate to GM, are needed for the development of GM beneficial and not harmful.

REFERENCES

1. Farooq, M and Aziz, T and Hussain, and Rehman, H and Jabran, K and. Khan, MB. 2008. *Glycine betaine Improves Chilling Tolerance in Hybrid Maize.* J. Agronomy & Crop Science (2008) ISSN 0931-2250.
2. Fatwa Indonesian Ulema Council no 35 of 2013 on Genetic Modified.
3. Gubrium, E.K., Clevenger, D.J., Clark, D.G., Barrett, J.E. *and* Nell, T.A.2000 *Reproduction and horticultural performance of transgenic ethylene-insensitive petunias.* J. Am. Soc. Hort. Sci.125, 277–281.
4. Indonesian Government Regulation No. 21 of 2005 on the biological safety of GM products.
5. Irath, Bagh, and Choudhary, and Sen, GVG, and Buysse, Jeruyn, and Meer, PVD, and Ssens, SB. 2014 *Regulatory options for genetically modified crops in India.*Plant Biotechnology Journal (2014) 12, pp. 135–146.
6. Kim, Y.-S., Lim, S., Kang, K.-K., Y-J., Lee.,Y-H., Choi.*and* Y-E. And Sano, H.2011.*Resistance against beet armyworms and cotton aphids in caffeine-producing transgenic Chrysanthemum.*Plant Biotechnol.28, 393–395.
7. Kuiper, AH, and Kleter, GA, and Note born, PJM, and Kok, Eshter, J. 2001. *Assessment of the food safety issues related to genetically modified foods.* The Plant Journal (2001) 27(6).
8. Ma'ruf, A. Zulia, C. Safruddin. 2017. Rice Estate Development As State Owned Enterprises (SOEs) To Self Supporting For Food. European Academic Research.
9. Ma'ruf, A. 2016. Respon Beberapa Kultivar Tanaman Pangan Terhadap Salinitas. Bernas
10. Potera, C. 2007. *Blooming biotech.* Nat. Biotechnol. 25, 963–965.
11. Raffeiner, B., Serek, M. *and* Winkelmann, T.2009. *Agrobacterium tumefaciens mediated transformation of Oncidium and Odontoglossum orchid species with the ethylene receptor mutant gene etr1-1.* Plant Cell Tissue Organ Cult.98, 125–134.
12. Satoh, S., Watanabe, M., Chisaka, K. *and* Narumi, T.2008. *Suppressed leaf senescence in Chrysanthemum transformed with a mutated ethylene receptor gene mDG-ERS1(etr1-4).* J. Plant Biol.51, 424–427.
13. Sinaga, A. Ma'ruf, A. 2016. Tanggapan Hasil Pertumbuhan Tanaman Jagung Akibat Pemberian Pupuk Urea, SP-36, dan KCl. Bernas.
14. Stephen, F, and Chandler, 1 and Cory, Sanchez. 2012. *Genetic modification; the development of transgenic ornamental plant varieties.* PlantBiotechnology Journal.10, pp. 891–903.
15. Warner, R.2011.*Genetic approaches to improve cold tolerance of petunia.* Floricult. Int.June, *15–16*.
16. Weber, WE, and Bringezu, T, and Broer, I and Eder, J and Holz, F. 2007.*Coexistence Between GM and Non-GM Maize Crops – Tested in 2004 at the Field Scale Level (Erprobungsanbau 2004).* J. Agronomy & Crop Science 193, 79—92 (2007).
17. Zhang, Debing and Guo, Jinchau. 2011. *The Development and Standardization of Testing Methods for Genetically Modified Organisms and their Derived Product.* Journal of Integrative Plant Biology 2011, 53(7): 539–551.