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Prospects for Application of the Precautionary Principle in Utilization Agricultural Biotechnology

A'an Efendi, Dyah Ochtorina Susanti & Nuzulia Kumala Sari
Lecturer, Law Faculty, University of Jember

Abstract
The use of agricultural biotechnology provides an increased hunger for agricultural production and better processing of agricultural products. Increasing the capacity of agricultural products and processing includes plant breeding to increase and stabilize production yields, increase plant resistance from pests, diseases, and abiotic stresses such as drought and soil acidity, and increase the nutrient content of foodstuffs. Agricultural biotechnology is used to help achieve sustainability in agriculture. However, agricultural biotechnology is not without risks. For agriculture, these risks include health risks, environmental risks, biodiversity risks, and socio-economic risks. From a legal perspective, there is a known precautionary principle on the existence of a risk of certain events on health or the environment. When it cannot be scientifically proven that the risk will actually occur is not a reason to delay taking preventive action. The principle of prudence is normalized in statutory regulations. It has a normative character so that it becomes a guideline for the power of authority to be implemented by those who are the targets of enacting the law.

Keywords*: precautionary principle, biotechnology, agriculture*

Background

Agriculture plays a vital role in human life and the economy of a country. Agriculture produces food, which is a basic human need, and provides employment for most people from all countries of the world. The central functions of agriculture include (1) sources of livelihood; (2) contribution to national income; (3) food and feed supply sources; (4) significance for international trade activities; (5) marketable surplus; (6) source of raw materials; (7) significance in transportation; (8) foreign exchange resources; (9) employment; (10) job opportunities; (11) economic growth; (12) sources of savings; and (13) food security.[1]

[1] https://agriculturegoods.com/why-is-agriculture-important/, *Why is Agriculture Important and its Role in Everyday Life*, accessed September 27, 2020.

To increase the quality and quantity of agricultural products, the technology can be utilized in biotechnology. The utilization of biotechnology for agriculture can solve problems in the production and processing of agricultural products. This includes plant breeding to increase and stabilize production yields, increase crop resistance from pests, diseases, and abiotic stresses such as drought and soil acidity, and increase the nutrient content of potatoes and rice.[2] Biotechnologists believe that biotechnology can help achieve sustainability in agriculture. Biotechnology increases production saves time and money and leads to reduced use of chemicals in agriculture.[3]

In Indonesia, one of the main problems with increasing food production is shrinking agricultural land. Agricultural experts claim that biotechnology can be used to solve several problems facing the agricultural sector.[4] Biotechnology can be used to improve quality and provide cheap food for the community.[5]

However, the use of agricultural biotechnology is not without potential risks. Andersen and Cohen stated that the potential benefits of using agricultural biotechnology and the potential risks are still focused on applying agricultural biotechnology in developed countries. Meanwhile, biotechnology's contribution to poverty alleviation and enhancement of food and nutrition security and the potential risks of its use in developing country agriculture received little attention in the form of statements of support. This fact often ignores the differences between agricultural conditions in developed and developing countries.[6] According to Wieczorek, agricultural biotechnology can pose risks to health, the environment and ecology, and social issues. In health, agricultural biotechnology is at risk of allergens and toxins as well as antibiotic resistance. In environmental and ecological terms, the risks that can arise from agricultural biotechnology include the potential for gene and superweed escape, impacts on "non-target" species, antibiotic resistance, insecticide resistance, and biodiversity loss. Social issues arising from the use of biotechnology for agriculture such as labeling, technology terminator, and safety and regulation.[7]

From a legal perspective, regarding the risk or potential risk of a certain event on health and the environment, there is what is known as the precautionary principle. It cannot be scientifically proven that the bad risk will actually occur. It is not a reason to postpone any anticipatory or preventive action. The precautionary principle has emerged as part of a discussion about the most effective way to protect health and the environment in the face of very uncertain risks.[8] The main goals in public health are preventing disease and promoting health in society. The concept of prevention and, therefore, precaution has always been at the core of public health practice.[9]

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[2] Fasiha F. Khan, *Applications of Biotechnology in Agriculture*, World Journal of Biology and Biotechnology, Volume 2, Issue 1, 2018, p.139.

[3] Hengameh Deldar Ghasemi et.al, *Biotecnology in Agriculture and its Relationship to the Principles of Sustainable Agriculture, Conference Paper*, The First National Conference on Modern Achievement in Biosciences and Agriculture, at ZabolUniversity, January 2015, p.1.

[4] https://agrifood.id/pentingkah-bioteknologi-untuk-pertanian-indonesia/, *Pentingkah Bioteknologi untuk Pertanian Indonesia?*, accessed September 28, 2020.

[5] https://www.antaranews.com/berita/739421/pakar-bioteknologi-penting-untuk-pertanian-indonesia, Pakar: bioteknologi penting untuk pertanian Indonesia, accessed September 28, 2020.

[6] Per Pinstrup-Andersen and Marc J. Cohen, *Agricultural Biotechnology: Risks and Opportunities for Developing Country Food Security*, International Journal Biotechnology, Vol. 2, Nos. 1/2/3, 2000, p. 145-146.

[7] Ania Wieczorek, *Use of Biotechnology in Agriculture—Benefits and Risks*, CTAHR, May 2003, p. 4-5.

[8] Marco Martuzzi and Joel Tickner, *Dealing with Uncertainty – How Can the Precautionary Principle Help Protect the Future of our Children?*, from Marco Martuzzi and Joel Tickner (Eds*), The Precautionary Principle:Protecting Public Health, the Environment and the Future of Our Children* (Copenhagen: WHO Regional Office for Europe, 2004), p. 15.

[9] Neil Pearce, *Public Health and the Precautionary Principle*, dalam Marco Martuzzi and Joel Tickner (Eds*), The Precautionary Principle:Protecting Public Health, the Environment and the Future of Our Children* (Copenhagen: WHO Regional Office for Europe, 2004), p. 49.

The precautionary principle must be normalized in-laws and regulations so that it has a normative character so that it becomes a guideline that has the authority to implement. Without being formulated as a norm in statutory regulations, the precautionary principle will only become an abstract thing and merely a scientific discussion object.

Based on this background, the formulation of the research problem includes: (1) why should the use of agricultural biotechnology based on the precautionary principle ?; (2) what is the existing agricultural laws and regulations been made based on the precautionary principle ? and (3) what are the prospects for reforming the agricultural legislation based on the precautionary principle?

Discussion

Rationality means having a reason or understanding or based on reason or logic.[10] In this paper's context, rationality is interpreted as looking for logical reasons for the application of the precautionary principle to laws and regulations relating to the use of agricultural biotechnology.

It is based on the precautionary principle that in cases of serious or irreversible threats to human health or ecosystems, recognized scientific uncertainties should not be used as grounds for postponing preventive action. The precautionary principle becomes a tool to bridge uncertain scientific information and political responsibility to prevent damage to human health and ecosystems.[11] Central to the precautionary principle lies in the simple, intuitive idea that decision-makers must act ahead of scientific certainty to protect the environment and human health from the harm it causes. The precautionary principle demands that humans take care of themselves, their descendants, and the life-preserving processes that maintain their existence.[12] The precautionary principle is applied in the use of agricultural biotechnology for three reasons. First, the failure of traditional risk analysis to protect public health. Philip J.Landrigan and Leonardo Trasande stated:

Risk analysis and risk management are tools currently used to protect populations from toxic environmental hazards. These methods, as currently practiced, have a major drawback: they only consider one chemical at a time; they fail to account for the unique exposures and specific vulnerabilities of vulnerable groups in the population, such as infants and children; and they assume, even without toxicological testing data, that the chemical causes no injury to health until the injury is proven incontrovertible. For this reason, traditional risk assessments fail to protect the health of infants and young children.[13]

Second, there is the limited scientific knowledge to predict risk from a particular substance or activity. The precautionary principle is a public policy guideline for decision making in conditions of scientific uncertainty. The limitations of science prevent the precautionary principle; its purpose is to enable and encourage precautionary action that serves values based on what is known and what is not known. The precautionary principle encourages careful observation of all aspects of science, from the research agenda to funding, design, interpretation, and boundaries of the study. Based on the precautionary principle, when there is a

[10] Linda Picard Wood (Ed), *Merriam-Webster's Dictionary of Law* (Massachusetts: Merriam-Webster, Incorporated, 2011).

[11] Marco Martuzzi and Joel Tickner, *Introduction – the precautionary Principle: Protecting Public Health, the Environment and the Future of Our Children*, from Marco Martuzzi and Joel Tickner (Eds), *The Precautionary Principle:Protecting Public Health, the Environment and the Future of Our Children* (Copenhagen: WHO Regional Office for Europe, 2004), p. 7-8.

[12] Andrew Jordan & Timothy O'Riordan, *The Precautionary Principle: a Legal and Policy History*, from Marco Martuzzi and Joel Tickner (Eds), *The Precautionary Principle:Protecting Public Health, the Environment and the Future of Our Children* (Copenhagen: WHO Regional Office for Europe, 2004), p. 31.

[13] Philip J. Landrigan and Leonardo Trasande, *Applying the Precautionary Principle in Environmental Risk Assessment to Children*, from Marco Martuzzi and Joel Tickner (Eds), *The Precautionary Principle:Protecting Public Health, the Environment and the Future of Our Children* (Copenhagen: WHO Regional Office for Europe, 2004), p. 121-122.

threat of danger that can be trusted, it must take preventive action, even when it cannot fully understand the proposed activity's impact. In other words, the precautionary principle combines the ethical notion of the duty to prevent harm with the reality of the limits of scientific understanding.[14]

Third, applying the precautionary principle's emphasis on preventive action is more beneficial than prevention or recovery following the maxim of "prevention is better than cure" or according to the principle that "an ounce of prevention is worth more than a pound of cure."[15] Within the scope of international environmental law, prevention deals with the issue of how can avoid harm to human health and the environment, recognizing that the economic and social costs of avoiding damage and injury are almost always lower than the costs of repair, maintenance or compensation after a loss has occurred.[16] Prevention assumes the utmost importance in any effective environmental and health policy because it allows the action to be taken to protect the environment and health at an earlier stage.[17]

The definition of agriculture can be divided into two parts, namely, related to a series of agricultural activities and the scope of agriculture. The first definition starts from the processing of agricultural land, the preparation of agricultural crop products, planting crops, collecting agricultural products (harvesting), processing agricultural products, marketing, and distribution of agricultural products. The scope of agriculture includes forestry, animal husbandry, plantation, and horticulture.

Starting from the definition of agriculture, agricultural legislation includes all laws and regulations relating to a series of activities and the scope of agriculture. These statutory regulations include the constitution, laws, delegation regulations, and autonomous regulations.

Based on the results of the inventory carried out, various agricultural laws and regulations were found, namely:

1. Constitution
   a. 1945 Constitution of the Republic of Indonesia.
2. Law
   a. Law Number 12 of 1992 concerning Plant Cultivation Systems.
   b. Law Number 8 of 1999 concerning Consumer Protection.
   c. Law Number 39 of 1999 concerning Human Rights.
   d. Law Number 41 of 1999 concerning Forestry.
   e. Law Number 29 of 2000 concerning Plant Variety Protection.
   f. Law Number 31 of 2004 concerning Fisheries as amended by Law Number 45 of 2009 concerning Amendments to Law Number 31 of 2004 concerning Fisheries.
   g. Law Number 4 of 2006 concerning Ratification of the International Treaty on Plant Genetic Resources for Food and Agriculture (International Agreement on Plant Genetic Resources for Food and Agriculture).
   h. Law Number 18 of 2009 concerning Animal Husbandry and Animal Health.
   i. Law Number 32 of 2009 concerning Environmental Protection and Management.
   j. Law Number 36 of 2009 concerning Health.
   k. Law Number 13 of 2010 concerning Horticulture.
   l. Law Number 18 of 2012 concerning Food.

[14] Ted Schettler and Carolyn Raffensperger, *Why is a Precautionary Approach Needed?,* from Marco Martuzzi and Joel Tickner (Eds*), The Precautionary Principle:Protecting Public Health, the Environment and the Future of Our Children* (Copenhagen: WHO Regional Office for Europe, 2004), p. 66.

[15] Glenn M. Wiser and Daniel B. Magraw, JR., *Principles and Approaches of Sustainable Development and Chemicals Management for Strategic Approach to International Chemichals Management (SAICM)*, Center for International Environmental Law (CIEL), July 2005, p. 17.

[16] *Ibid.*

[17] *Ibid.*

m. Law Number 39 of 2014 concerning Plantation.

3. Government Regulations
   a. Government Regulation Number 69 of 1999 concerning Food Label and Advertisement.
   b. Government Regulation Number 102 of 2000 concerning National Standardization.
   c. Government Regulation Number 28 of 2004 concerning Food Safety, Quality, and Nutrition.
   d. Government Regulation Number 21 of 2005 concerning Biosafety of Genetically Engineered Products.
   e. Government Regulation Number 17 of 2015 concerning Food Security and Nutrition.
4. Presidential Regulation
   a. Presidential Regulation Number 39 of 2010 concerning the Commission on Biosafety of Genetically Engineered Products.
   b. Presidential Regulation Number 83 of 2017 concerning Strategic Policy on Food and Nutrition.
   5. Ministerial Regulation
      a. Regulation of the Minister of Agriculture of the Republic of Indonesia Number 19 / Permentan / OT.140 / 3/2012 concerning Requirements for Quality of Seeds, Livestock Seeds, and Animal Genetic Resources.
      b. Regulation of the Minister of Agriculture of the Republic of Indonesia Number 37 / Permentan / OT.140 / 7/2011 concerning Conservation and Utilization of Plant Genetic Resources.
   6. Regulations for Non-Ministerial Institutions
      a. Regulation of the Head of the National Agency of Drug and Food Control of The Republic of Indonesia Number HK.03.1.23.03.12.1563 of 2012 Guidelines for Assessment of Food Safety for Genetically Engineered Products.
      b. Regulation of the Head of the National Agency of Drug and Food Control of The Republic of Indonesia Number HK.03.1.23.03.12.1564 of 2012 Supervision of Food Labeling of Genetically Engineered Products.
      c. Regulation of the Head of the National Agency of Drug and Food Control of The Republic of Indonesia Number 16 of 2016 concerning Microbiological Criteria in Processed Food.
      d. Regulation of the Head of the National Agency of Drug and Food Control of The Republic of Indonesia Number 19 of 2016 Amendment to the Regulation of the Head of the Drug and Food Supervisory Agency Number Hk.03.1.23.03.12.1563 of 2012 concerning Guidelines for Assessment of Food Safety for Genetically Engineered Products.
      e. Regulation of the Head of the National Agency of Drug and Food Control of The Republic of Indonesia Number 6 of 2018 Food Control for Genetically Engineered Products.

The principle of prudence is found only in Law Number 32 of 2009 concerning Environmental Protection and Management. The implementation of environmental protection and management is carried out based on the precautionary principle, where the uncertainty regarding the impact of a business and/or activity due to limited mastery of science and technology is not a reason to postpone steps to minimize or avoid threats to pollution and/or damage—living environment. The precautionary principle in Law Number 32 of 2009 concerning Environmental Protection and Management is generally applicable to all types of businesses and/or activities, including agricultural businesses or activities. Still, it only focuses on their impact on the environment. Do not reach the impact on health.

Other laws and regulations relating to the precautionary principle include the obligation to take preventive measures, such as Law Number 12 of 1992 concerning Plant Cultivation Systems. Other laws and regulations regulate provisions that have implications for the obligation to take preventive measures, for example, Article 9 paragraph (3) of Law Number 39 of 1999 concerning Human Rights which regulates the right of every

person to have a good and healthy environment which has implications for the obligations of the perpetrator. Efforts to produce products that do not endanger the environment.[18]

Legal reform is an act of correcting a law to become new or replace an old law with a new law.[19] Legal reform is a change to the law in several ways to improve it. Legal reform can take the form of reconstruction, intensification of functions, or assignment of functions. The reconstruction can take the form of replacement, structuring, management, and enforcement of the law. Legal replacement is carried out on laws that lack or exhaustion of support. Legal structuring is carried out on miscoordinated legal conditions, limited by unclear substance or overlapping functions and substances. Legal management is carried out against laws whose carrying capacity is adequate, and legal development is carried out against laws with better carrying capacity, based on the conditions' needs.[20] Legal reform must be carefully planned and directed to build a modern national legal order concerning the ideals of Pancasila, which is capable of providing an efficient and responsive legal framework and rules for the administration of life in the present and future.[21]

Legal reform of agricultural legislation must start from legal harmonization because agricultural regulations are sectoral. The sectoral model setting has several weaknesses. First, the existence of various types of regulations cannot avoid overlapping or conflicting regulations with one another. Second, the result of the first weakness creates difficulties for implementing regulations by the competent organs. Fifth, make it difficult for law enforcement if there is a violation.

Legal harmonization is a process in which various law elements are combined or adapted to one another to form a coherent legal entity while maintaining their individuality.[22] In a relative sense, legal harmonization means creating legal relationships between different laws.[23] Harmonization of agricultural laws and regulations is carried out by establishing a legal relationship between the various existing laws and regulations while maintaining each statutory regulation's distinctive characteristics. Regulations remain sectoral but are not completely separate from one another.

After harmonization, the next action is to change or replace the agricultural legislation with new regulations to adopt the precautionary principle. Of the existing agricultural laws and regulations, only Law Number 32 of 2009 concerning Environmental Protection and Management has accepted the principle of prudence. Therefore amendments or replacements are required for other laws and regulations.

The norming of the precautionary principle in agricultural legislation is not the final stage of legal reform. The legislative body must establish an effective control model to ensure that the competent government organs properly and properly implement laws and regulations.

Conclusion

The rationality of applying the precautionary principle in the use of agricultural biotechnology includes: (1) failure of traditional risk analysis as a means of protecting public health and the environment; (2) limited scientific knowledge to predict the existence of risk from the substance or activity; and (3) prevention is always more beneficial from economic and social aspects than remedial action for damage that has occurred.

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[18] Terry Hutchinson. *Researching and Writing in Law* (Pyrmont NSW: Lawbook Co, 2002), p. 54.

[19] Lili Rasjidi dan I.B. Wyasa Putra, *Hukum Sebagai Suatu Sistem* (Bandung: Mandar Maju, 2003), p. 179.

[20] *Ibid.*

[21] Bernard Arief Sidharta, *Refleksi tentang Struktur Ilmu Hukum: Sebuah Penelitian tentang Fundasi Kefilsafatan dan Sifat Keilmuan Ilmu Hukum sebagai Landasan Pengembangan Ilmu Hukum Nasional Indonesia* (Mandar Maju: Bandung, 2000), p. 212.

[22] Martin Boodman, *The Myth of Harmonization of Laws*, The American Journal of Comparative Law, Vol. 39, 1991, p, 702.

[23] *Ibid.*

The precautionary principle in the current agricultural legislation regime is only in Law Number 32 of 2009 concerning Environmental Protection and Management. The principle of prudence in this law means that the uncertainty of the impact of agricultural businesses or activities that utilize biotechnology due to limited mastery of science and technology is not an excuse to postpone steps to minimize or avoid environmental pollution and/or damage.

The prospect of reforming agricultural legislation based on the precautionary principle starts with the harmonization of statutory regulations. Harmonization is continued by normalizing the principle of prudence in agricultural legislation and oversight by the legislative body to ensure that the authorized government organs will properly and correctly carry out the statutory regulations.

Recommendation

The House of Representatives and the President made changes to agricultural legislation to adopt a precautionary principle as a tool for early anticipation of risks or potential risks of using agricultural biotechnology. The House of Representatives implements an effective control mechanism to ensure that authorized government organs properly and coorectly implement laws and regulations.

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