# Living modified organism (LMO)



## DEFINITION

Any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology.

The Cartagena Protocol on Biosafety 2000[1]

*Note: In general use the term living modified organism (LMO) is considered to be functionally the same as genetically modified organism (GMO).*

Secretariat of the Convention on Biological Diversity (CBD Secretariat) 2013[10]

## NOTES ON DEFINITION

*Living Modified Organism (LMO) and Genetically Modified Organism (GMO)*

In general usage, LMOs are considered to be the same as GMOs[3]. Many countries use the terms 'genetically modified organism', 'genetically engineered organism', and 'transgenic organism' in domestic legislation to describe LMOs[4]. During the negotiations of the Cartagena Protocol, EU member countries accepted the LMO definition in the negotiated text and interpreted this definition to be in accordance with the definition of a GMO in the EU Directive[5]. Both terms can therefore be used interchangeably.

## FURTHER DEFINITIONS

**Genetically Modified Organism (GMO)**

Any organism, with the exception of human beings, in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination.

EU Directive on the deliberate release into the environment of genetically modified organisms 2001/18/EC, Article 2, paragraph 1 & paragraph 2[2]

*Supporting definitions:*

**Organism** – Any biological entity capable of replication or of transferring genetic material.

EU Directive on the deliberate release into the environment of genetically modified organisms 2001/18/EC, Article 2, paragraph 1 & paragraph 2 [2]

**Living organism** – Any biological entity capable of transferring or replicating genetic material, including sterile organisms, viruses and viroids.

Cartagena Protocol; Article 3, Use of Terms section h. [1]

**Modern biotechnology** – The application of a) In vitro nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles, or b) fusion of cells beyond the taxonomic family, that overcome natural physiological reproductive or recombination barriers and that are not techniques used in traditional breeding and selection.

Cartagena Protocol; Article 3, Use of Terms section i) [1]

## KEY POINTS

- The term LMO is used interchangeably with GMO in general usage.
- The use of GMOs and LMOs is heavily debated. They can provide considerable benefits to agriculture and advances in modern medicine. However, there is a potential risk to human health and the environment through a perceived lack of experience in the technology used and insufficient knowledge of the effects.
- Article 19 of the Convention on Biological Diversity (CBD) included the provision to create a protocol setting out the safe transfer, handling and use of any LMO resulting from biotechnology which resulted in the Cartagena Protocol.
- The Cartagena Protocol is an international agreement, established as a supplement to the CBD, which aims to protect biological diversity from the potential risks imposed by LMOs resulting from modern biotechnology.

## INTRODUCTION

Genetic manipulation of organisms has been carried out for centuries as humans have bred domestic animals and plants from wild relatives. Historically, this has been done by promoting characteristics within the breeding stock which are of use. However, scientific advances mean that it is now possible to manipulate genetic material directly, rather than relying on natural reproduction and choice of the best offspring. The resulting genetically modified organism/living modified organisms (hereafter referred to as LMOs) have had particular genes inserted into their genetic code and often will have the ability to pass on this manipulated genetic code to their offspring [4].

## DEBATE

There is considerable debate surrounding LMOs. On one side the application of modern biotechnology has considerable potential for enabling improvements in a variety of fields, from medicine to agriculture and from management of pollution to industrial production. However, on the other side there are issues including ethical considerations and the possible risks to human health and the environment. The perceived lack of experience with the technology compounds these potential concerns, including

insufficient information on the effect of these organisms if released into the environment and the possible serious effects on biodiversity [4].

## THE CARTAGENA PROTOCOL

The Convention on Biological Diversity (CBD) was adopted amidst the ongoing debate over the potential risks of LMOs. Article 19 of the CBD discusses the handling of biotechnology. It includes the provision to create a protocol setting out the safe transfer, handling and use of any LMO resulting from biotechnology where required (CBD Article 19) [6]. This became articulated within an international agreement, known as the Cartagena Protocol. The Cartagena Protocol aims to protect against potential risks posed by LMOs which result from modern biotechnology, such as adverse effects on biodiversity and human health [1]. The Protocol promotes biosafety by establishing rules and procedures for the safe transfer, handling, and use of LMOs, with specific focus on transboundary movements of LMOs [3]. The Cartagena Protocol was adopted in 2000 and entered into force in 2003, with applicability to terrestrial, aquatic and marine environments and the transit of LMOs by air and sea.The Cartagena Protocol states that it is in accordance with the the precautionary approach of Principle 15 of the Rio Principles [7], which calls for the implementation of cost-effective measures to prevent environmental degradation from "threats of serious or irreversible damage", even if full scientific certainty is lacking [8]. It has significant overlap with the Basel Convention [9], which controls transboundary movements of hazardous wastes and their disposal, due to the similarity of issues relating to potentially hazardous materials [4]

## REFERENCES & WEBSITE


1. CBD Secretariat (2000) Cartagena Protocol on Biosafety to the Convention on Biological Diversity. Secretariat of the Convention on Biological Diversity, Montreal, Canada.
2. European Union (2001) Directive 2001/18/EC on the deliberate release into the environment of genetically modified organisms. OJ 106/1 1–38
3. CBD Secretariat (2012) Frequently Asked Questions (FAQs) on the Cartagena Protocol.
4. Mackenzie R, Burhenne-guilmin F, Viña AGM La, Werksman JD (2003) An Explanatory Guide to the Cartagena Protocol on Biosafety. IUCN, Gland, Switzerland and Cambridge, UK
5. Husby J (2007) Definitions of GMO/LMO and modern biotechnology. In: Traavik T, Ching L (eds) Biosaf. first Holist. approaches to risk Uncertain. Genet. Eng. Genet. Modif. Org. Tapir Academic Press, Trondheim, Norway, pp 569–581
6. Convention on Biological Diversity (1992) Convention on Biological Diversity. Secretariat of the Convention on Biological Diversity, Montreal, Canada
7. UN (1992) Rio Declaration on Environment and Development 1992. United Nations, New York, USA
8. Ward FA, Pulido-Velazquez M (2009) Incentive pricing and cost recovery at the basin scale. J Environ Manage 90:293–313
9. Basel Convention (1992) Basel Convention on the Control of Transboundary Movements of Hazardous Wastes. United Nations Environment Programme, Basel, Switzerland


Category:

Internationally recognised definitions

Key terms: In depth

Related pages

Genetically modified organism (GMO) (Terms)

Cartagena Protocol (Terms)

Biotechnology (modern) (Terms)

Page last updated 17 December 2019