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Voice of the global industrial hemp industry

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Genetically Engineered Hemp: FIHO Calls for a Moratorium

The Federation of International Hemp Organizations (FIHO) is mandated to unite industry leaders, consolidate market expertise, coordinate resources and speak with one voice on hemp issues at the global level. FIHO aims to identify and create opportunities as well as to scale up sustainable hemp production, marketing and trade to benefit the global hemp industry, consumers, and the environment.

Until such time as comprehensive international risk analyses are completed and risk mitigation strategies are identified, **FIHO asks all stakeholders to call for a moratorium on outdoor production of genetically engineered (GE) and genetically modified (GM)¹ hemp and cannabis.** FIHO further requests all stakeholders to address the issue with their national regulators; encouraging them to limit as much as possible the risks of contaminating traditionally bred hemp cultivars with GE/GM *Cannabis sativa* L. genetic material. This may only be achieved by prohibiting outdoor production of GE/GM cannabis and industrial hemp plants until risks have been analyzed and risk mitigation has been developed.

With the recent USDA approval² of the first known genetically engineered³ industrial hemp variety⁴, FIHO feels it is important to raise awareness of and share our consolidated concerns on this important issue.

GE and GM technologies can improve plant traits to achieve sustainable agriculture objectives⁵. Agronomic benefits may include increased yields, pests and disease resistance, drought tolerance, and nutritional enhancement. Environmental benefits may include reductions in herbicide use. However, there is significantly more to consider in the case of industrial hemp.

Like other crops,⁶ GE/GM hemp comes with identified and unidentified risks and concerns. It is essential to identify and compare these risks to the intended benefits, and address them before considering the commercial cultivation and use of GE/GM hemp. For FIHO, one of the main issues is the risk of destabilizing the global market, as the concerns are compelling for producers and manufacturers of hemp products.

Some of the risks associated with genetic modification⁷ and how they could affect hemp include:

1. Environmental Impact:

- a. Cross-Contamination: Cross pollination of GE/GM hemp with traditionally-bred hemp varieties, leading to the inadvertent introduction of GE/GM traits to unintended populations, is of significant concern.⁸ As an open-pollinated crop (pollinated by natural agencies such as wind or insects without human intervention),⁹ hemp is known to prolifically spread pollen over wide distances¹⁰ and the pollen spreading is much higher than for other crops such as maize (corn), canola or soybeans.
- b. Seed sovereignty: The patenting of GE/GM seeds has led to debates over seed ownership and access. Companies producing GE/GM seeds may prosecute farmers who are using non-GE/GM seeds that were incidentally cross-pollinated by GE/GM varieties.¹¹

- c. **Loss of Biodiversity:** Large-scale cultivation of GE/GM hemp could reduce the genetic diversity within the hemp species, displacing traditional varieties, potentially promoting monocultures and making hemp more vulnerable to pests and disease¹².
- d. **Resistance Development:**
 - i. **Pests and Diseases:** Over time, pests and diseases have the potential to evolve resistance to genetic modifications,¹³ necessitating the use of additional pesticides or alternative methods of pest control. Hemp naturally produces cannabinoids that protect the plant against pests;¹⁴¹⁵¹⁶ producing GE/GM hemp varieties without any THC or other cannabinoids could lead to producing varieties that would need more modifications or increased use of pest control products;
 - ii. **Herbicide Resistance:** GE/GM hemp engineered for herbicide resistance can lead to increased herbicide use, which can have negative environmental consequences.¹⁷
- e. **Ecological Disruption:** Altered hemp plants may impact local ecosystems, causing unintentional harm to non-target beneficial organisms like pollinators and natural predators of pests that depend on hemp as a food source.¹⁸¹⁹ GE/GM hemp plants may also disrupt ecological relationships impacting nutrient cycling and negatively affecting soil health and microbial communities²⁰ which are crucial for agricultural sustainability.

2. **Regulatory and Trade Issues:**

- a. **Regulatory Incongruity:** There is no global consensus on what constitutes GE/GM plants and food containing genetically modified organisms (GMOs), as jurisdictions define the term based on their own standards. In the USA,²¹ for example, GE/GM/GMO definitions are limited to the deliberate addition of a novel gene through genetic manipulation. However, in Europe²² and Japan,²³ GE/GM/GMO encompasses the addition of novel genes, as well as the editing of the genome using GE technologies. Canada²⁴ regulates GE/GM plants and GMO food within the existing regulatory framework for “Novelty and plants with novel traits”²⁵ with the focus on the traits expressed in the products and not on the method used to introduce those traits. Such differences in GE/GM/GMO standards represent significant risk to international trade in agricultural products.
- b. **Trade Restrictions:** Some countries have strict regulations or bans on GE/GM crops and GMO foods, which can limit the international trade of GE/GM hemp and GMO hemp products. When GM flax was inadvertently released in Canada, it collapsed the exports of Canadian flax to the European, Japanese and South Korean markets. As a further result, flax production dramatically decreased, greatly affecting Canadian farmers.²⁶ The introduction of GM maize in Mexico raised concerns about the potential for genetic contamination of traditional maize crops. This in turn led to concerns about the country's ability to export traditional maize to regions with strict regulations against GMOs.²⁷ Regulatory and legal measures have been taken to address some of these concerns, but they continue to be significant issues for Canadian and Mexican farmers and environmental advocates.
- c. **Labeling and Traceability:** Strong public opposition to GMOs in some regions of the world has led to demands for mandatory labeling and restrictions on their use in food products. The labeling and traceability of GMO hemp products would be critical to inform consumers and comply with regulations.²⁸

3. **Allergenicity and Health Concerns:**

- a. **Allergenic Potential:** The introduction of new genes or proteins into GM hemp has the potential to trigger immune-related allergic reactions to food products (i.e. eczema, hives, asthma, or anaphylaxis) for some individuals.²⁹³⁰ This would be a negative outcome, as hemp foods are considered allergen-free³¹ in many jurisdictions.
- b. **Food Intolerances:** The introduction of new genes or proteins into GE/GM hemp has the potential to trigger non-allergic reactions to food products (i.e. gluten/celiac, lactose, or tyramine intolerance) for some individuals.³²

- c. Unintended Effects: Genetic modifications can lead to unintended consequences, such as changes in the composition of hemp plants that may affect their nutritional profile, safety for consumption or introduce unknown long-term health effects.³³

4. Social and Economic Concerns:

- a. Farmer Dependency: GE/GM hemp varieties may force farmers to purchase specific seeds or technologies, potentially leading to economic challenges for farmers.³⁴ In some jurisdictions, GE/GM rules would prevent farmers growing seed for their own future production.³⁵
- b. Socioeconomic Equity: The adoption of GE/GM hemp can favor large-scale farming operations over small-scale growers, potentially exacerbating economic disparities.³⁶ While this is an issue in all jurisdictions, the effect can be much greater in developing economies using traditional agricultural production practices³⁷.
- c. Ethical Concerns: Many people have objections to genetic modification of plants. In Europe and some other regions in the world, GMO products are widely rejected by the public.³⁸ Consumers of hemp products are typically looking for 'natural' products³⁹. The introduction of GE/GM hemp could negatively impact consumers' perception of hemp and erode hemp's market position.

Global hemp food and fiber producers currently rely on both imports and exports to ensure the success of their businesses⁴⁰. Considering the above-noted potential negative production and trade consequences and their far-reaching impacts on the emerging global hemp industry, FIHO recommends that outdoor cultivation of industrial hemp and cannabis should remain free of cultivars derived from GE and/or GM technologies until such time that a full international risk assessment (environmental and economic) has been completed and the identified risks have been adequately understood and mitigated.

The European Union's Deliberate Release Directive⁴¹ outlines a framework for the environmental risk assessment and approval processes for the deliberate release of GMOs into the environment, either for cultivation or for other purposes such as research. This framework may provide some potentially useful tools and mechanisms to assist in completing the environmental risk assessment piece of FIHO's recommendations. However, the EU Framework lacks the mechanisms to enable an economic risk assessment.

Notwithstanding the above methodology, **FIHO recommends that risk assessment and risk mitigation activities be science-based and not reflect regional political priorities**. As such, FIHO does not recommend aligning risk assessment and risk mitigation activities with any jurisdictional priorities that promote or limit the use of GM or GE technologies or promote or limit the sale or trade in GMO food products.

For FIHO, it is essential to understand what is happening or can happen around the world regarding GE/GM hemp. Until these concerns can be addressed, **FIHO asks all stakeholders to call for a moratorium on outdoor production of genetically engineered (GE) and genetically modified (GM) hemp and cannabis until risks have been analyzed and risk mitigation has been developed**.

FIHO will continue to encourage and support research and innovation while working with international regulators to ensure that sound science-based policies are in place and aligned to protect producers and strengthen the global hemp industry.

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- ⁵ Frontiers in Sustainable Food Systems, Research Topics, Genetically Modified (GM) and Genome-Edited (GE) Plants For Achieving Sustainable Agriculture: <https://www.frontiersin.org/research-topics/55394/genetically-modified-gm-and-genome-edited-ge-plants-for-achieving-sustainable-agriculture#overview>
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- ¹⁵ Contrasting Roles of Cannabidiol as an Insecticide and Rescuing Agent for Ethanol-induced Death in the Tobacco Hornworm Manduca sexta: <https://www.nature.com/articles/s41598-019-47017-7>
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