POSITION STATEMENT
Gene Editing Technology in the Forest Growing Sector

Biotechnology encompasses a wide range of techniques

Biotechnology is defined as "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use."[1] This includes a wide range of procedures, including cultivation of plants, genetic engineering, and domestication of animals.

Gene editing in plants is a smaller subset of the wide range of genetic modification techniques.

One of the disciplines within the field of biotechnology is gene editing techniques. These techniques remove or add genes from the same or similar species of plants as a way to breed out undesirable characteristics, or to breed in desirable characteristics. Gene editing only removes or adds genetic material from similar plant species that can naturally cross breed. Gene editing replicates the way normal breeding randomly recombines genes, but in a very controlled and targetted way.

The legal and regulatory environment needs clarifying for the forest growing sector

Almost all international jurisdictions allow gene editing to take place as long as no DNA is added from other sources. New Zealand's current law does not differentiate between gene editing and other forms of genetic manipulation, and therefore captures gene editing under the rules banning all forms of genetic modification.

The FOA supports re-drafting New Zealand legislation that clearly defines which techniques and processes are acceptable, and which are not. Clarity of definition will assist the sector to invest in research and development to provide economic certainty for the sector, and economic and environmental benefits to our nation.

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[1] UN Convention on Biodiversity, article 2 Use of terms, "Biotechnology" means any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify https://www.cbd.int/convention/articles/default.shtml?a=cbd-02

The benefits of gene editing for the forest growing sector are far greater than the potential risks

The FOA considers New Zealand legislation should be reviewed to allow gene editing and gene edited plant materials to be researched and deployed within New Zealand for the following reasons:

- Gene editing does not include transfer of genetic material between species.
- It is impossible to determine by examining material if it has been produced by gene editing or has occurred naturally.
- New Zealand's laws are out of step with other jurisdictions, giving our competitors an advantage that New Zealand's primary industries do not have.
- Gene editing for non-food plant species further reduces an already low level of risk.
- All New Zealand's commercial plantation forestry species are introduced and not closely related to any indigenous New Zealand tree species.

What are the benefits to the forest growers/wood production sector?

The FOA considers there are several benefits to gene editing for the sector that warrant investigation. These fall under the categories of production efficiency/disease resistance, and environmental and social benefits.

<u>Environmental and social benefits based on reduction in chemical use</u>

1. Trees that are naturally resistant or have inherently more vigorous growth are likely to require less application of fertilisers or pesticides to achieve the same outcomes. Trees that have these characteristics will therefore likely require less application of chemicals.
2. Trees that do not produce fertile seeds or cones would not spread into areas where they are not wanted, for example, into areas where the government and industry have a programme of controlling wilding conifers. This has benefits for production forestry by removing the need for a restriction on preferred plantation species that threaten to spread in iconic landscapes.

<u>Economic benefits based on more efficient production and disease resistance</u>

1. Gene edited trees could grow faster and stronger, and desirable attributes can be introduced much more rapidly than through traditional breeding methods. This allows the possibility of producing more volume from the same land area and maintaining a competitive New Zealand industry, especially where a number of New Zealand's competitors are increasingly relying on this technique.
2. Trees could be more resistant to pests and pathogens that cause loss of production or are a biosecurity risk. This reduction of biosecurity risk is particularly important for New Zealand's forest growing sector, where the industry is largely built around a single species. For example, it would be prudent risk management for the forest growing sector to have trees under development which are resistant to the major pine Phytophthora pathogens.

Special consideration needs to be given to biosecurity responsiveness.

Gene technologies have promise here but further work is needed to ensure that *immediate* 'off-the-shelf' technologies and (where possible) resilient germplasm is developed as additional insurance against pests and pathogens that put exotic and indigenous species at risk.

The potential risks of gene editing need to be managed by central government

The FOA considers any identified risks should be evaluated on a case-by-case basis within the current legislative requirement of the Environmental Protection Authority (EPA) and Hazardous Substances and New Organisms Act while ensuring a transparent and comprehensive consultation process is also incorporated. There is reason for caution and careful evaluation of risk - gene editing has the potential to mitigate threats from pests and pathogens, but challenges remain: the genetic mechanisms that underlie trees ability to resist disease is poorly understood, tree genomes are complex, and there is a lack of information currently on releasing new genotypes into the environment.[2] This should be a reason to clearly identify risks, not to rule out gene editing altogether.

The often-cited risk of crops that have been subject to gene editing could prevent the marketing of crops that have not (or organic crops) has also not been proven. In Canada, for example, since the widespread planting of crops that have been subject to gene editing, the production of organic crops has continued to grow.

The benefits of crops that require fewer pesticides, grow greater yields, and are more able to cope with the effects of climate change are worth exploring. This is the existence of humanity's contemporary challenge.

Our view

The science of gene editing for commercial plantation forests offers several potential benefits for the forest industry in New Zealand, and, in the case of invasive conifers, of New Zealand as a whole.

The FOA considers that the benefits of gene editing have the potential to improve sustainability by contributing positively to several environmental and production challenges.

Our view is therefore to support and endorse gene editing research and deployment, where appropriate, in New Zealand, to capture the net benefits for the industry and New Zealand, while ensuring protocols and processes reduce any potential for harm.

The FOA considers that any decisions regarding the use of gene editing should be made at the national (central government level) while ensuring adequate consultation. It is important that any evaluation of the use of these techniques is considered fully, efficiently, and transparently. The FOA considers the most appropriately resourced and mandated body for such evaluation is the Environmental Protection Agency.

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2 https://www.eforester.org/Main/SAF_News/2019/Inside_the_Forestry_Source__Biotechnology_Has_Potential_to_Mitigate_Forest_Threats.aspx