NULL SEGREGANTS REACTIVE PUBLIC/MEDIA MESSAGING

Response to queries made prior to a decision:

Suggested that this is provided by Richard Scott (AgResearch Senior Scientist, named Applicant):

We can confirm that an application has been made to the Environmental Protection Agency (EPA) seeking a determination of the legal status of *null segregant* organisms. The application is supported by fourteen organisations working across research and the agricultural, horticultural, and forestry industries. A null segregant organism is the offspring of a genetically modified plant or animal - but the offspring is not genetically modified, nor contains any characteristics of being genetically modified, because it did not inherit the modifications from either parent. Currently a null segregant organism is treated as if it is a genetically modified organism, however a legal determination will provide clarity on this for all parties. This legal determination we are seeking will not alter laws on genetically modified organisms in New Zealand, nor will it lessen the rigorous ethical and safety processes followed by researchers when it comes to research involving these null segregant organisms. Whatever the determination is from the EPA, it will provide guidance to researchers about the future direction of research and what opportunities may be available for New Zealand. The application is currently in a legal process and we will be able to comment on the outcome when it is formally released.

Response once we are advised of a determination/decision *(to be edited slightly according to Determination)*:

Key messages

- A null segregant organism is the offspring of a genetically modified plant or animal - but the offspring is not genetically modified, nor contains any characteristics of being genetically modified, because it did not inherit the modifications from either parent. Currently a null segregant organism is treated as if it is a genetically modified organism, however a legal determination will provide clarity on this for all parties.
- The application made to the Environmental Protection Agency (EPA) was seeking a determination of the legal status of null segregant organisms. This application followed a legal process available through the Hazardous Substances and New Organisms (HSNO) Act 1996, which prohibits release of genetically modified organisms in New Zealand without approval. The application was considered by a HSNO decision-making committee of the EPA.
- The application was supported by fourteen organisations working across research and the agricultural, horticultural, and forestry industries. It is the view of the applicants that there is no scientific basis for null segregant organisms to be classified as genetically modified.
- The determination from the EPA will provide clarity and direction for researchers as to what plant and animal research is allowed within regulation, and what opportunities may be available to researchers for the benefit of New Zealand. It is not for the purpose of any specific piece of research that is being carried out or planned.
- While a decision in favour of the applicants may provide/could have provided additional opportunities for the benefit of New Zealand, it will not alter the law on genetically modified organisms in New Zealand, nor will it lessen the rigorous ethical and safety processes followed by researchers where it comes to any experimentation involving these null segregant organisms.

Is this opening the door to GMOs being released into our environment and food supply in NZ?

No, this determination clarifies the legal classification of null segregant plants and animals where we do not believe there is a scientific basis for them to be considered as genetically modified organisms. As such we do not see this creating any additional risk for New Zealand, but we do see potential for benefits from future research.

How will this determination change the research and what will it mean?

This determination will provide clarity for the future direction of certain research that will involve these null segregant plants or animals. Once we have the determination, research organisations and their stakeholders will be in a better position to look at what opportunities are available.

What are examples of research that utilises null segregants?

Producing offspring of a specific sex

Male hatchlings of layer chickens have no economic value - they can't lay eggs and are not considered suitable for meat production - so they are culled after hatching. Research is underway to develop methods to detect and remove eggs that contain male embryos. One concept is to insert a gene coding for green fluorescent protein (GFP) into the Z chromosome of breeding hens. A male embryo will inherit the Z chromosome from its female parent. When an egg containing a male embryo is exposed to UV light it will fluoresce green, enabling it to be identified and removed well before hatching. Female embryos will not inherit the GFP-marked Z chromosome and are thus considered null segregants - their genome will not contain any new DNA. The null segregant female chicks would then be grown to maturity and used for egg production. *Doran TJ, Morris KR, Wise TG, O'Neil TE, Cooper CA, Jenkins KA, Tizard MLV (2017) Sex selection in layer chickens. Animal Production Science 58, 476-480. https://doi.org/10.1071/AN16785*

Speed Breeding

One method currently being examined by horticultural researchers is to use genetic modification for speed breeding. As some species take years to reach maturity, the standard practice of crossing plants over multiple generations to introduce new traits can take many years. Genetically modifying varieties involved in the breeding programme, so that they can mature rapidly (*e.g.*, mature in 1 year instead of 4 years), means that new desirable characteristic(s) can be incorporated into elite commercial varieties in significantly less time than it would normally take. Note that the genetic modification is only used to speed up the breeding programme and that the new characteristic arises from a non-GM change in the genome. To produce the final generation, the line with the now stably incorporated new characteristic is crossed 1-2× with a non-GM line, and the genetic modification for speed breeding can be bred out. The new variety now possess the desired characteristics, matures at the normal rate, and is not genetically modified. *Royal Society Te Apārangi (August 2019) Gene Editing: Scenarios in the Primary Industries. Pg19-21. https://www.royalsociety.org.nz/assets/Uploads/Gene-Editing-Scenarios-Primary-industries-DIGITAL.pdf*.