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Submitted by email to [gm-regulation@defra.gov.uk](mailto:gm-regulation@defra.gov.uk)

17 February 2022

Dear Madam/Sir

**Re: Application from Cambridge University Crop Science Centre to release a genetically modified organism, reference 21/R54/01 as published at <https://www.gov.uk/government/publications/genetically-modified-organisms-cambridge-university-crop-science-centre-21r5401>**

We are writing on behalf of GM Freeze, Genewatch UK, GMWatch, EcoNexus, the Soil Association, Organic Farmers and Growers, the Organic Research Centre, Sheepdrove Organic Farm, the Sustainable Food Trust, The Kindling Trust, Unicorn Grocery, Real Seeds, GM Free Somerset, GM Free Dorset, GM Free Cymru, Genetic Engineering Network, Agri-Activism UK, Green Christian, SE Essex Organic Gardeners and the Springhead Trust to request that the above application to release genetically modified (GM) barley is refused.

**GM Freeze** is the umbrella campaign for a moratorium on GM in food and farming in the UK.

**GeneWatch UK** is a not-for-profit organisation which aims to ensure genetic science and technologies are used in the public interest. **GMWatch** provides the public with the latest news and comment on genetically modified (GMO) foods and crops and their associated pesticides. **EcoNexus** analyses and reports on new technologies that have the potential for significant negative impacts on biodiversity and ecosystems.

**The Soil Association** is the charity that digs deeper to transform the way we eat, farm and care for the natural environment. **Organic Farmers & Growers** were the first UK organic certification body to be approved by the Government and now certify more than half of UK organic land. **The Organic Research Centre (ORC)** is the UK's leading independent organic research organisation. **Sheepdrove Organic Farm** and award-winning eco-conference centre are committed to sustainability, conservation and education.

**The Sustainable Food Trust** is a registered charity with a goal of promoting food and farming systems that nourish the health of the planet and its people. **The Kindling Trust** works with communities, farmers, health providers, activists and policymakers to create a fairer more sustainable food system for all. **Unicorn Grocery** in Manchester has pioneered a cooperative approach to sustainable urban food supply. **Real Seeds** provides open pollinated seed appropriate for growers producing vegetables under sustainable low input conditions.

**GM Free Somerset** is a grass roots campaign supported by individuals, groups, local businesses and charities that exist to promote rural sustainability. **GM Free Dorset** is a grass roots campaign promoting rural sustainability across the county of Dorset. **GM Free Cymru** is the community pressure group campaigning to keep Wales free of genetically modified crops. **Genetic Engineering Network** facilitates the exchange of information between groups and campaigners. **Agri-Activism UK** is a network of people who campaign for cleaner, healthier and more sustainable agricultural and food systems.

**Green Christian** are inspired by their faith and work to care for Creation through prayer, living simply, public witness, campaigning and mutual encouragement. **SE Essex Organic Gardeners** is a local group of Garden Organic, supporting and working with the Soil Association and Pesticide Action Network UK. The **Springhead Trust** promotes environmental education, sustainability, organic agriculture and local performing arts.

We do not believe that this trial should go ahead. The research is at an early stage and represents a risk, while alternative holistic approaches to improving arbuscular mycorrhizal fungi (AMF) colonisation are well understood. In summary, our objection covers the following points:

1. The research is at too early a stage to justify an open field trial
2. The proposed containment measures are inadequate
3. The applicant's risk assessment is incomplete
  - 3.1. The application does not include a full molecular characterisation
  - 3.2. The cause and nature of metabolic changes has not been identified
4. Genetic manipulation is not a helpful approach to improving AMF colonisation

## 1. THE RESEARCH IS AT TOO EARLY A STAGE TO JUSTIFY AN OPEN FIELD TRIAL

The research appears to be at an early stage and should not be allowed to proceed to open field trials until the findings of contained laboratory and glasshouse stages have been subjected to peer review. We have found no papers published by the research team and the applicant states (Part A6) that “The GMOs in the release have been described in the manuscript by Li et al which has been submitted to the Journal *Cell* in December 2021. However, details of the proposed release and its purpose have not yet been published.”

The inclusion in this trial application of eleven lines exploring the impact of impaired arbuscular mycorrhizal fungi colonisation – and only two that focus on the supposed aim of the overall project, ie *improved* colonisation – further suggests that this whole project is at a very early stage of development. Similarly, the applicant states (Part A1 paragraph 30) that “Traits that could be measured from this trial include soil nutrient availability, AMF community composition, leaf chlorophyll content, flowering time, and disease incidence. In short, the field evaluation of transgene-derived traits which alter plant association with AMF will be carried out, with the predominant focus being on enhancement to AMF association in the presence and absence of phosphorus fertilizers.” Such a broad range of study areas, and the applicants’ apparent uncertainty about what actually *will* be measured (as opposed to the long list of traits that *could* be measured), further supports the conclusion that this project is simply not ready for an open field trial.

We recognise and, indeed, support, the value of increasing our understanding of the symbiotic relationship between commercial food crops and the soil microbiome. However, open field trials of genetically modified organisms always carry a risk of escape and negative consequences for farmers, nature and wildlife so they should be reserved for research projects that are well advanced. Facilities are available that combine the safety of contained use with more realistic field conditions than can be achieved in a glasshouse, for example, the controlled environmental facility, ‘Ecotron’<sup>1</sup>.

It is worth noting here that the public consultation on this trial application closes on 19 February, yet the applicant states (Part A1, paragraph 31) that “if consent is granted, this year’s field trial will start with drilling from Mid-February 2022”. This suggests a lack of respect for due process, especially when combined with the statement on the Crop Science Centre website<sup>2</sup> linking the trial to the applicant’s support for a proposed legislative change that had not yet begun its Parliamentary progress when the application was lodged.

## 2. THE PROPOSED CONTAINMENT MEASURES ARE INADEQUATE

The applicant states in Part A1, paragraph 4 that “the pollen grains are relatively heavy and any that are released from the flower remain viable for between a few minutes and a few hours” and that (Part A1, paragraph 26) “no cereals or grasses will be cultivated or allowed to grow for a further 20 metres from the outer edge of the pollen barrier”. However, Wagner and Allard’s 1991 study into pollen migration in barley<sup>3</sup> found that outcrosses can occur at distances up to 60m. Responding to this, a European Environment Agency report<sup>4</sup> concluded that distance is “the single most important factor affecting pollen dispersal rates in barley” and that an isolation distance of 60m would be appropriate “if very low levels of contamination are acceptable”.

No level of contamination from an experimental field trial is acceptable, particularly as the UK is (as identified by the applicant – Part A1, paragraph 7) a major barley producer. If the trial is allowed to proceed, this separation distance should be increased to a minimum of 60m and/or netting should be employed, as in a number of other GM field trials.

### 3. THE APPLICANT'S RISK ASSESSMENT IS INCOMPLETE

#### 3.1. The application does not include a full molecular characterisation

Although we welcome the inclusion (Part A1, paragraph 24, Table 12) of primer sequences to identify the deliberately induced mutations, the applicant has not performed a full molecular characterisation of the 13 GMO lines that they propose to plant in open field trials. The information provided in table 10 (Part A1, paragraph 14) suggests that they have analysed the intended sites of the planned genetic mutations, but this will only have detected any unintended effects in the immediate flanking regions. Without full molecular characterisation, we cannot know whether - or what - off-target changes have taken place elsewhere in the genome.

Genetic manipulation – whatever vocabulary is used for political effect – is an inherently unpredictable process that is associated with unintended effects at the genetic, epigenetic and cellular level. These unintended effects may go on to have negative agronomic, environmental and health implications, as demonstrated in other GM crop varieties<sup>5,6</sup>. The applicant claims (Part A1, paragraph 15) that “*Agrobacterium*-mediated transformation generates stable insertions” but the use of this vector has in fact been shown to induce genetic deletions, insertions, chromosomal rearrangements, translocations, scrambling of sequences and epigenetic perturbations<sup>7</sup>. Similarly, the cauliflower mosaic virus 35S promoter – which is included in several plasmids – has been linked to increased potential for genetic rearrangements<sup>8</sup>.

We note that the Advisory Committee on Releases to the Environment (ACRE)'s advice to Ministers on a previous application (19/R52/02)<sup>9</sup> stated that molecular characterisations “are not required in applications for small trial releases of GM plants unless they are needed to inform the risk assessment”. However, the proposed trial is complex and questions remain about noted plant metabolite differences (3.2, below) so further molecular analysis is very much needed to effectively assess risk.

#### 3.2. The cause and nature of metabolic changes has not been identified

The applicant states (Part A1, paragraph 22) that all lines “have exhibited a difference in the expression pattern of a number of genes involved in the plant metabolites”. It is not clear whether these differences in expression refer to the intended changes relevant to mycorrhizal colonisation or something else. As any other changes would suggest either errors in the genetic manipulation process (causing unintended genetic alterations) or unexpected impacts of reported genetic changes (perhaps through pleiotropic effects), further investigation is essential before considering consent for an open field trial.

As noted in 1 and 3.1, above, the trial should not be allowed to proceed until full genome sequencing has been completed to identify any off-target genetic changes and a peer-reviewed paper on the contained laboratory and glasshouse stages of these experiments has been published to ensure that any unexpected impacts of either planned or unplanned changes have been declared and properly considered.

### 4. GENETIC MANIPULATION IS NOT A HELPFUL APPROACH TO IMPROVING AMF COLONISATION

The applicant states, on its website<sup>10</sup> that the field trials “aim to evaluate whether crop interactions with a naturally occurring soil fungi can be improved to promote more sustainable food production” but genetic engineering is neither necessary nor well suited to this endeavour.

AMF colonisation is an indicator of soil health rather than an isolated outcome controlled by specific genes. Approaches that support the development of good soil structure, stable aggregates and healthy nutrient cycling will bring manifold benefits in addition to supporting the symbiotic relationship between crop plants and the soil microbiome.

A 2008 study<sup>11</sup> found that AMF spore abundance and species diversity were significantly higher in organic farming systems, concluding that “agricultural practices significantly influence AM fungal community structure and mycorrhizal inoculum potential”. The use of long-rooted (often older) crop varieties, crop rotation and evolutionary or population breeding approaches will all support AMF colonisation. Within conventional farming, a 2021 study<sup>12</sup> found that “crop diversity enriches AMF communities, counteracting the negative effects of agricultural intensification on AMF, providing the potential to increase agroecosystem functioning and sustainability.”

An open field trial, with the associated risks of escape, contamination and unexpected outcomes, cannot be justified when the adoption of agroecological farming practices would quickly achieve both the stated aims of this project and significant additional benefits for farmers and the environment. Indeed, the applicant and their funders would be well advised to explore how they can support farmer-led research such as that coordinated by the Innovative Farmers network<sup>13</sup>.

The proposed trial would release poorly characterised GMOs into the environment when alternative, holistic approaches to achieving the same aim are well understood. We request, therefore, that the Minister denies consent and prevents this open-air field trial going ahead.

Yours faithfully

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## References

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