

Information Technology and Innovation Foundation
700 K Street NW, Suite 600
Washington, DC 20001

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United States Department of Agriculture
Animal & Plant Health Inspection Service
Regulatory Analysis and Development, PPD
Station 3A-03.8
4700 River Road Unit 118
Riverdale, MD 20737-1238

This document provides comments on the “Petition for Determination of Non-regulated Status: State University of New York College of Environmental Science and Forestry; Blight-Resistant Darling 58 American Chestnut (Docket Number: APHIS-2020-0030),” as requested by USDA/APHIS.¹

APHIS should grant this petition and clear the way for the re-introduction of the American Chestnut (*Castanea dentata*) by way of large-scale planting of seedlings throughout the eastern deciduous forests of the United States. Once a keystone species and pillar of local economies, an estimated 4 billion trees of the species were killed by the introduction of the exotic fungal disease *Cryptomeria parasitica*, which spread in the early years of the 20th Century.

The petition submitted to APHIS documents, with substantial supporting data from numerous tests and experiments, shows that the tree (known as Darling 58)—which was improved to contain the gene-encoding a protein, oxalate oxidase (OxO), derived from spinach—presents no novel or undue hazard to humans or the environment. This gene, while new to the chestnut genome, is and has been widespread in the global

¹ State University of New York College of Environmental Science and Forestry, *Petition for Determination of Nonregulated Status for Blight-Resistant Darling 58 American Chestnut*, August 19, 2020, <https://www.federalregister.gov/documents/2020/08/19/2020-18135/state-university-of-new-york-college-of-environmental-science-and-forestry-petition-for>.

environment and human diet for thousands of years.² Opponents have suggested no plausible mechanism of action through which exposure to it could present any risk to the environment or human health and safety.

APHIS is certain to hear objections to this petition and demands to deny it and prohibit the re-introduction of the American Chestnut. Opponents claim there is a lack of long-term data showing safety; that the tree can serve as a reservoir for chestnut blight to infect other species; that pollen from the tree may be allergenic; that the antibiotic resistance marker gene it contains is dangerous to release into the environment; that introduced transgenic trees would be impossible to trace if the petition is granted; and that the potential for pollen to distribute the OxO-mediated resistance trait is a hazard that must be avoided. These claims come from parties with vested interests who are doctrinally opposed to molecular biological improvements to plant breeding. They are without foundation.

It is true that we do not have data spanning centuries showing the Darling 58 tree described in the petition is “safe.” But we have many centuries of experience confirming that the chestnut tree itself is both extremely valuable and safe, along with all its genetically engineered components. The OxO gene is derived from spinach, which first emerged in recorded history as an edible plant in central Asia no later than the fourth century AD.³ In all the tests and data provided by petitioners, there is no hint of any novel hazard nor any risk to humans or the environment from exposure to this spinach gene in the chestnut tree context.

Opponents claim the transgenic, blight-resistant tree might serve as a reservoir through which the blight will become more widespread. This claim is absurd. The problem opponents complain about is already a reality—the extirpation of the native American Chestnut demonstrates that *Cryptomeria parasitica* is already widespread throughout North America.⁴ Denying the petition would do nothing to ameliorate that reality,

² Arnau Ribera, Yuling Bai, Anne-Marie A. Wolters et al., “A review on the genetic resources, domestication and breeding history of spinach (*Spinacia oleracea* L.),” (*Euphytica* 216(48), 2020), <https://link.springer.com/article/10.1007/s10681-020-02585-y>.

³ Arnau Ribera, Yuling Bai, Anne-Marie A. Wolters et al., “A review on the genetic resources, domestication and breeding history of spinach (*Spinacia oleracea* L.),” (*Euphytica* 216(48), 2020), <https://link.springer.com/article/10.1007/s10681-020-02585-y>.

⁴ Daniel Rigling and Simone Prospero, “*Cryphonectria parasitica*, the causal agent of chestnut blight: invasion history, population biology and disease control,” (*Mol Plant Pathol* 19(1):7-20, January 2017), doi: 10.1111/mpp.12542, <https://pubmed.ncbi.nlm.nih.gov/28142223/>.

whereas granting it might help in the event the resistance trait manages to spread to remaining residual chestnut populations, which would be beneficial, though unlikely.

Opponents claim pollen from the tree may be allergenic, and that this alleged allergenicity presents a problem of magnitude sufficient to deny the petition. But “Nutritional analysis of Darling 58 chestnuts shows that there are no substantial nutritional differences compared to non-transgenic nuts, and analysis of the OxO enzyme indicates a lack of allergenicity or toxicity (Section 8.4).”⁵ In other words, the petition documents that pollen from this chestnut is no more or less allergenic than pollen from trees from the pre-blight population. The argument raised here by opponents would justify the destruction of many pollen producing trees, grasses, and other plants, which would make the planet much less hospitable to humans.

Opponents claim that the antibiotic resistance marker gene it contains is dangerous to release into the environment. This argument is also absurd. The antibiotic resistance gene in the Darling 58 construct is derived from *Escherichia coli*, a ubiquitous bacterium, and the gene is widely distributed around the world and already common in human digestive tracts. The antibiotics to which it confers resistance are of little or no clinical value in humans and the gene confers no selective advantage in the absence of the antibiotic. Its presence is irrelevant to any safety calculation related to Darling 58.

Opponents claim that introduced transgenic trees would be impossible to trace if the petition is granted. But all petitions granted by APHIS are contingent on an enduring requirement to report anything unexpected or anomalous. Furthermore, *Castanea dentata* is not a cryptic species, nor is it unusually mobile. There are few biological organisms on the planet more easily tracked and monitored than trees, especially those deliberately planted. There are no wild trees of the species left, thanks to the blight, so any tree found out of place would obviously be a Darling 58 or scion. It is, in fact, urgently hoped for that such offspring will rapidly become widespread, as such trees will be objects of pride, and widely celebrated. This claim is not credible.

Opponents claim that the potential for pollen to distribute the OxO-mediated resistance trait is a hazard that must be avoided. It is hard to imagine any mechanism through which pollen-mediated dissemination might render problematic a protein that has been safely consumed by humans for centuries at least, and likely millennia. In the unlikely event viable pollen containing the gene were to find its way to a receptive flower on a relictual, wild American chestnut, it might produce seeds heterozygous for the trait. If a series of additionally

⁵ State University of New York College of Environmental Science and Forestry, *Petition for Determination of Nonregulated Status for Blight-Resistant Darling 58 American Chestnut*, August 19, 2020, <https://www.federalregister.gov/documents/2020/08/19/2020-18135/state-university-of-new-york-college-of-environmental-science-and-forestry-petition-for>.

unlikely events followed, then the end result might be infinitesimally to expand the gene pool of the restored species. This would be a good thing.

In summary, the downsides of approving this petition are vanishingly small, while the potential upsides are considerable. APHIS has more than sufficient data to justify setting aside the specious concerns raised by opponents who are driven by misunderstanding or dogma. ITIF urges that the petition be approved.

Sincerely,

/s/ L. Val Giddings, Ph.D.

Senior Fellow
Information Technology and Innovation Foundation
700 K Street NW, Suite 600
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