April 23, 2022

Washington Department of Ecology
VIA Website upload

Re: Rulemaking Clean Fuels Program Rule Chapter 173-424 WAC

Dear Department of Ecology Staff:

Thank you for the opportunity to comment on the proposed Washington State Clean Fuels Program.

Nuseed Background

As background, Nuseed is a global agricultural seed company. Nuseed delivers value **Beyond Yield™** through dedicated service, locally proven canola, carinata, sorghum and sunflower seed for farm customers and new plant-based solutions for end-use customers globally.

Nuseed develops input traits for top agronomic performance while going beyond yield to commercialize plant output traits with new value and market opportunities. Nuseed Carinata is an example of a non-food non-GMO cover crop developed for specific end-uses and supplied by Nuseed Value Chains built through industry collaboration.

Over 250 Nuseed employees work across 11 global locations and two world-class Nuseed Innovation Centers with one in West Sacramento, CA and the other in Argentina. Established in Australia in 2006, Nuseed has grown to offer industry leading germplasm, advanced molecular capabilities, regional R&D and commercial trials with dedicated teams in Australia, Europe, North and South America, and sales in more than 30 countries.

Brassica Carinata Background

Cover cropping has a rich heritage as bell beans were grown in vineyards during early Roman times and even early use occurred in fields in ancient China and India. Modern U.S. agriculture has been slow to adopt productive cover cropping (in 2017 >5% of all U.S. agricultural land was cover cropped) as it has been historically seen as uneconomical.

Most seed companies have been hesitant to invest in research and development (R&D) to support this sector as the market is underdeveloped and not prioritized by farmers. Brassica Carinata (Carinata) has been in development for over two decades with various companies and government agricultural labs (e.g., Agriculture Canada) working on the breeding of a true productive cover crop that can survive harsh climatic conditions during the winter with low sunlight and provide a small mustard sized grain at harvest, prior to spring planting of food crops. The market has not valued a non-GMO, non-food, productive cover crop until now.

The University of Florida (UF) saw Carinata as an opportunity back in 2013 and, with Canadian company Agrisoma Bioscience, Inc. (Agrisoma), received a grant from the Florida Department of Agriculture to conduct a 3-year evaluation for winter Carinata cover cropping. This led UF to lead a public/private consortium, including Agrisoma as a crop development

partner, to apply for a United Stated Department of Agriculture (USDA) National Institute of Food and Agriculture (NIFA) grant in 2017. In 2018 the 5-year program Southeast Partnership for Advanced Renewables from Carinata (SPARC) was created and funded via a $15 million grant from USDA NIFA to UF. This program was aimed at finalizing development and moving Carinata to agricultural commercialization.

In 2017 Agrisoma began a commercial program for Carinata cover crop in the southeastern United States. Agrisoma struggled due to not having the experience, resources, and industry recognition of a traditional agricultural seed company in gaining farmer adoption. In 2019 Nuseed purchased the Carinata assets from Agrisoma. Nuseed made the strategic decision to pause the U.S. commercial program to finalize the Carinata seed hybrid technology, complete further product development and focus resources on commercial deployment that was more advanced in Argentina to maximize impact.

Since 2019 Nuseed has accelerated the education, adoption, and commercial deployment of Carinata in Argentina with Carinata acres targeted this year a 5x growth from 2021. This results in growers as small as 10 hectares gaining direct access via climate-smart Carinata to global low carbon greenhouse gas (GHG) markets through Nuseed's establishment of a supply chain network committed to improving and providing value to climate-smart agriculture.

Nuseed can directly compensate growers to practice sustainable low GHG agriculture through the entire supply chain network by paying extra for their Carinata grain at elevation for low tillage, manure application, and low nitrogen fertilizer use. Nuseed has also surveyed and ranked all the fertilizers commercially available to the grower on a GHG impact and prioritizes those low GHG fertilizers to the growers. The educational journey Nuseed has undertaken with the grower is focused on instilling that it is important how you grow the crop, not only how much yield you get, because if you fertilize too much, over till, the grain value will be negatively impacted as you have put too much GHGs into its production. Nuseed works with a local digital provider in Argentina and internal systems to collect the production and GHG data and certifies all the Carinata grain against a range of environmental, social and governance (ESG) metrics, via third party SCS Global – Auditor.

Nuseed has advanced the market for Carinata products and has sold 10s of million gallons of Carinata oil through supply chain partners into the European Renewable Energy Directive (RED) renewable fuel market.

This proven framework of a commercial program that promotes climate-smart commodities practices, with a digital system to measure/quantify, monitor, report and verify GHG benefits and third-party verification, Nuseed intends to replicate for grower community in the southeast United States in the fall 2022 and move the low GHG feedstock in the US renewable fuel marketplace.

Brassica Carinata Listed as Approved Feedstock

Cover crops grown as a winter cover and not in rotation with main crops during the typical summer season are a cornerstone of any climate-smart agriculture program. They are introduced as an additional high biomass cover crop to an existing main crop rotation, during seasons where the land is not typically in productive use. These climate-smart cover crops enhance farmland productivity as they increase the soil organic carbon balance, adopt sustainable soil management

practices that reverse soil carbon depletion and produce additional protein output per unit of agricultural land, while causing no displacement of local or global food and feed production. This is critical to meet global, national, state, and local climate goals and not cause land use change and/or displacement.

What has been pointed out in a number of comments both written and oral to the Washington Department of Ecology is that cover crops and the definition both of the crop and cropping system is critical. Nuseed highly recommends that the Washington Department of Ecology look at not the generic classification of cover crops but look at the individual crops and their corresponding cropping systems and classify them individually similar to what is accomplished with all crops such as soybeans, corn, canola, etc. Carinata is the only cover crop presented in Table 1 of the Indirect Land Use Conversion for Washington Clean Fuels Standard by Life Cycle Associates, LLC. We strongly recommend Washington Department of Ecology look at carinata and the significant public data available to allow it to be listed as an approved feedstock into Washington State Clean Fuels Program.

Indirect Land Use Conversion

The biomass and protein produced from winter cover crops is additional to the output provided by the existing cropping systems. The additional protein reduces the overall pressure on the global demand for vegetable protein. Therefore, the cultivation within such systems can be deemed no Indirect Land Use Change (ILUC), as it causes no need to displace food or feed. Furthermore, in these climate-smart agricultural systems, as the biomass/food/feed supply continues to increase, the pressure to clear land is further relieved, leading to a reverse effect on ILUC. The non-food oil provides a scalable feedstock solution for renewable fuels that does not impact the food agricultural rotation.

This approach which is similar to the positive ILUC approach for soybeans, canola and other oil seeds is shown in the models (GTAP-BIO, GLOBIOM) by increase the GHG number due to protein pressure on the system. Years of work went into ILUC analysis around carinata starting back in 2016 with the ICAO Committee on Environmental Protection (CAEP) and the Alternative Fuels Task Force (AFTF). This negative numbers for the oil seed crops are based off the same science as the positive ILUC number response and not on the soil carbon accumulation but on the additional protein.

As shown below in the two tables both GLOBIOM and GTAP-BIO were used for the analysis of carinata. Both showed a negative ILUC emission value (gCO_2e/MJ). Picking zero as the number for carinata is not a conservative approach but simply disregarding the scientific approach of the models. If the Washington State Department of Ecology wishes to have a conservative approach, then it should not use ILUC modeling and approach all ILUC as zero. If the Washington State Department of Ecology wishes to use ILUC models the below data shows that carinata should receive an appropriate scientific value associated with the models and not arbitrarily pick a number that is not based on the science of the model.

CORSIA Eligible Fuels – Life Cycle Assessment Methodology Version 4 – Nov 2021

Table 79: Default ILUC emission values for SAF pathways, in g CO2e/MJ

Region	Feedstock	Conversion Process	GTAP-BIO	GLOBIOM	Default ILUC Value
USA	Corn	Alcohol (isobutanol) to jet (ATJ)	22.5	21.7	22.1
USA	Corn	Alcohol (ethanol) to jet (ATJ)	24.9	25.3	25.1
Brazil	Sugarcane	Alcohol (isobutanol) to jet (ATJ)	7.4	7.2	7.3
Brazil	Sugarcane	Alcohol (ethanol) to jet (ATJ)	9.0	8.3	8.7
Brazil	Sugarcane	Synthesized iso-paraffins (SIP)	14.2	8.4	11.3
EU	Sugar beet	Synthesized iso-paraffins (SIP)	20.3	20.0	20.2
USA	Soy oil	Hydroprocessed esters and fatty acids (HEFA)	20.0	50.4	24.5
USA	Carinata* oil	Hydroprocessed esters and fatty acids (HEFA)	-12.9	-25.9	-21.4
Brazil	Soy oil	Hydroprocessed esters and fatty acids (HEFA)	22.5	117.9	27.0
Brazil	Carinata* oil	Hydroprocessed esters and fatty acids (HEFA)	-15.0	-24.9	-20.4
EU	Rapeseed oil	Hydroprocessed esters and fatty acids (HEFA)	20.7	27.5	24.1
Malaysia & Indonesia	Palm oil (open/close pond)	Hydroprocessed esters and fatty acids (HEFA)	34.6	60.2	39.1
USA	Miscanthus	Fischer-Tropsch (FT)	-37.3	-10.6	-32.9
USA	Miscanthus	Alcohol (isobutanol) to jet (ATJ)	-58.5	-8.7	-54.1
USA	Miscanthus	Alcohol (ethanol) to jet (ETJ)	-47.1	-8.2	-42.6
USA	Switchgrass	Fischer-Tropsch (FT)	-8.2	2.5	-3.8
USA	Switchgrass	Alcohol (isobutanol) to jet (ATJ)	-18.9	10.2	-14.5
USA	Switchgrass	Alcohol (ethanol) to jet (ETJ)	-15.2	8.4	-10.7
USA	Poplar	Fischer-Tropsch (FT)	-9.6	-0.6	-5.2
EU	Miscanthus	Fischer-Tropsch (FT)	-9.3	-26.5	-22.0
EU	Miscanthus	Alcohol (isobutanol) to jet (ATJ)	-16.6	-35.5	-31.0
EU	Miscanthus	Alcohol (Ethanol) to jet (ETJ)	-12.7	-27.8	-23.3
* Carinata grown as a secondary crop that avoids other crops displacement					

CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels – March 2021

Table 1. CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels

Fuel Conversion Process	Region	Fuel Feedstock	Core LCA Value	ILUC LCA Value	LS_f (gCO_2e/MJ)
Hydroprocessed esters and fatty acids (HEFA)	Global	Tallow	22.5	0.0	22.5
	Global	Used cooking oil	13.9		13.9
	Global	Palm fatty acid distillate	20.7		20.7
	Global	Corn oil (from dry mill ethanol plant)	17.2		17.2
	USA	Soybean oil	40.4	24.5	64.9
	Brazil	Soybean oil	40.4	27.0	67.4
	EU	Rapeseed oil	47.4	24.1	71.5
	Malaysia & Indonesia	Palm oil – closed pond	37.4	39.1	76.5
	Malaysia & Indonesia	Palm oil – open pond	60.0	39.1	99.1
	Brazil	Brassica carinata (grown as a secondary crop that avoids other crops displacement)	34.4	-20.4	14.0
	USA	Brassica carinata (grown as a secondary crop that avoids other crops displacement)	34.4	-21.4	13.0

Scalable Low Carbon Feedstock Solutions

More carbon currently is being emitted to the atmosphere than is bound to plants, soils, and the oceans, resulting in elevated concentrations of carbon. This increase has led to – and is exacerbating – climate change.

The central aim of the Paris Agreement is to strengthen the global response to the threat of climate change by limiting global temperature rise this century below 2 degrees Celsius (C) above pre-industrial levels and to pursue efforts to limit the temperature increase even further to no greater than 1.5 degrees C. The report from the Intergovernmental Panel on Climate Change (IPCC) says the 1.5 degree C goal is technically and economically feasible but limiting warming to 1.5 ˚C requires major and immediate transformation in all sectors.

According to the IPCC report, with current rate of greenhouse gas emissions the planet could surpass the 1.5 deg increase as early as 2030, and no later than mid-century. Therefore, in addition to large emissions cuts in the next decade, net CO2 emissions will need to be reduced to zero by mid-century. Dr. Rattan Lal, a Nobel Peace Prize Soil Scientist for his work with IPCC, has published papers documenting that the world's agricultural soils could potentially absorb 13 percent of the carbon dioxide in the atmosphere - the equivalent of the amount released in the last 30 years. Nuseed efforts on not only reducing emissions, but also removing and storing carbon from the atmosphere. Carbon removal is necessary for both moving to net-zero emissions and producing net-negative emissions.

Atmospheric CO_2 removal by biosequestration through plants is a solution for decarbonization with positive co-benefits for soil fertility, productivity, and water and nutrient retention. These improvements ensure more resistant agroecosystems and will help farmers deal with increasing climate variability. Additional biosequestration in soils is also a promising 'negative emissions' opportunity to mitigate climate change – it has been calculated that a 0.4% annual increase in soil carbon stocks could compensate for the increase of human caused CO_2 emissions.

Fossil fuels used in transport need to be replaced by renewables. The feedstock availability for advanced biofuels will need sustainable land-based feedstocks that enable atmospheric CO_2 removal leading to a climate-smart effect. Farmers in the U.S. and across the world are already on the front lines of climate change and have future challenges ahead of them. They have the potential to be part of the climate change solution, and that solution is in improving the soil.

As an agricultural provider of low GHG feedstocks that can scale to meet the demand of a clean fuel policy in Washington State, your decisions will have real, dramatic, and near-term consequences and can either unlock long-term supply of low GHG feedstocks or slow the deployment through market signals. As always, I am happy to provide any further data or answer any questions from the Washington State Ecology Team.

Sincerely,

Glenn Johnston
Global Regulatory Carinata
Nuseed