

## Camelina (*Camelina sativa* (L.) Crantz.) as a sustainable feedstock crop for advanced biofuel production on a global scale

**Fernando Guillen-Portal<sup>1</sup>**

Javier Prieto<sup>2</sup>  
 Laura Maher<sup>1</sup>  
 Dario Girotti<sup>3</sup>  
 Tavin Schneider<sup>1</sup>  
 Barney Bernstein<sup>1</sup>  
 Yuri Herreras<sup>2</sup>  
 Kevin Monk<sup>1</sup>  
 Michael Karst<sup>1</sup>

<sup>1</sup> Sustainable Oils, Inc.,  
 Great Falls, USA

<sup>2</sup> Camelina Company España,  
 Madrid, Spain

<sup>3</sup> Global Clean Renewables  
 (Argentina) SRL, Pergamino,  
 Argentina

### Background:

Camelina (*Camelina sativa* (Crantz.) L.), a cool season, non-food oilseed crop with proven low carbon intensity (CI) and reduced input requirements, is gaining global attention as a sustainable feedstock crop to satisfy the growing demand of the emerging advanced biofuel markets. Global Clean Energy Holdings, Inc. (GCEH) has been involved in the genetic improvement of camelina through its subsidiary Sustainable Oils, Inc., since 2006. Recently, the company integrated camelina breeding programs from Spain (Camelina Company España), and Argentina (Global Clean Renewables (Argentina) SRL) and started operations in Australia as well. This integrated camelina breeding program provides a unique opportunity for the development of superior camelina varieties as sustainable feedstocks for advanced biofuel production on a global scale.

### Objective:

To determine the levels of adaptability of elite camelina materials developed by GCEH breeding program to prevalent growing conditions in the United States (USA), Spain, Argentina, and Australia to assess their potential as sustainable feedstocks for advanced biofuel production on a global scale.

### Methods:

Data from multilocation field evaluations in 2021/2022 and 2022 from GCEH breeding programs in the USA, Spain, Argentina, and Australia were used in this study. Sets of elite camelina varieties and advanced experimental lines developed by GCEH, along with materials from other initiatives and standard check varieties were included in these studies. These materials were evaluated in replicated experiments using standard crop management practices in representative growing regions within each of the above stated geographies.

### Results:

In general, the growing seasons were characterized by varying levels of water shortages and high temperatures during late crop stages. A large variation in grain yield performance among the materials evaluated was observed within and across geographies. In the USA, genotypic grain yields ranged from 0.5 t ha<sup>-1</sup> to 1.0 t ha<sup>-1</sup> with top yielding materials comprising entirely varieties developed by GCEH's breeding programs in the USA and Spain (avg. yield 1.0 t ha<sup>-1</sup>). The superiority of performance and enhanced adaptability was associated with rapid early growth, early maturity, prolonged seed filling period, and increased seed weight. Genotypic grain yields in Spain ranged from 0.8 to 1.9 t ha<sup>-1</sup>. The top yielding group also included varieties from the USA and Spain (avg. yield 1.8 t ha<sup>-1</sup>). In Argentina, genotypic grain yields ranged from 0.8 to 1.4 t ha<sup>-1</sup>. Materials with higher yields included varieties from the USA and Spain (avg. yield 1.0 t ha<sup>-1</sup>). Grain yields in Australia did not show much variation among varieties, they ranged from 0.7 to 1.4 t ha<sup>-1</sup>, and the top yielding group included varieties from the USA from Spain as well (avg. yield 1.2 t ha<sup>-1</sup>).

### Conclusions:

Camelina proved to be a highly resilient crop to adverse growing conditions. Materials developed by the GCEH breeding programs showed wide adaptability to prevalent growing conditions across geographies, providing the opportunity to speed up the process of variety release on a global scale. Enhanced field-testing operations are underway to identify the most suitable varieties within and across geographies.