

# A new F<sub>1</sub> high-sugar, high-biomass sorghum variety "ENRYU" supports decarbonization efforts

Production

Implementation

Item: Sorghum

GHG emission reduction  
Biomass utilization

## Outline

We elucidated the principle of heterosis\* by genetically analyzing sorghum heterosis, an agriculturally important phenomenon, and identifying the genes sufficient for high-biomass sorghum. The new F<sub>1</sub> sorghum variety "ENRYU," which has a high sugar content and high biomass, is the first example of the principle application. For the decarbonized society, it proposes a new concept of cascade use† of the extracted syrup as an energy source and the residues as animal feed.

\* Heterosis: The phenomenon in which the first filial exhibits a trait superior to that of its parents.

† Cascade use: A multi-stage use of materials where a residue from one process is used in another process.

## Background/effect/note

The principle of heterosis in high biomass sorghum was elucidated through genetic analysis of the hybrid progeny generation (Fig. 1). The variety "ENRYU" (Fig. 2) was created by utilizing this principle, and it has a quantitative trait locus (QTL) (*qBRX-6*) derived from sweet sorghum, in addition to five genes sufficient for the culm length heterosis. Thus, the distinctive traits of high sugar content and high biomass were realized. Cultivation in temperate and tropical zones will enable the cascade use of extracted syrup and residues. The new variety "ENRYU" supports efforts toward developing a decarbonized society with a new carbon value chain linking agriculture, distribution, and consumption.

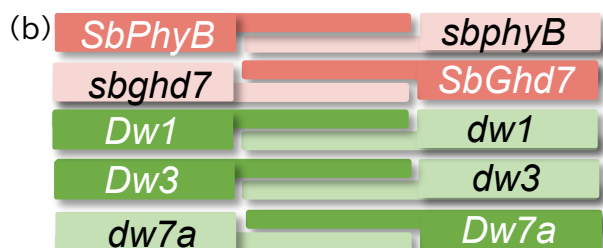
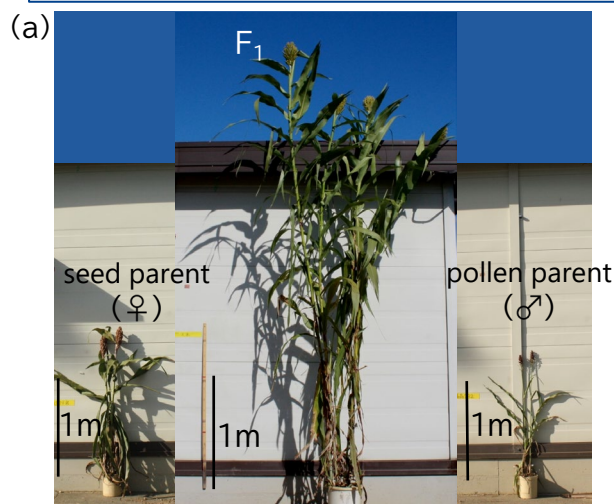


Fig. 1. Heterosis of a high biomass sorghum F<sub>1</sub> variety and five genes supporting the principle.

(a) Left: seed parent, right: pollen parent, center (Ref. 2): F<sub>1</sub>.

(b) Five genes controlling hybrid vigor.

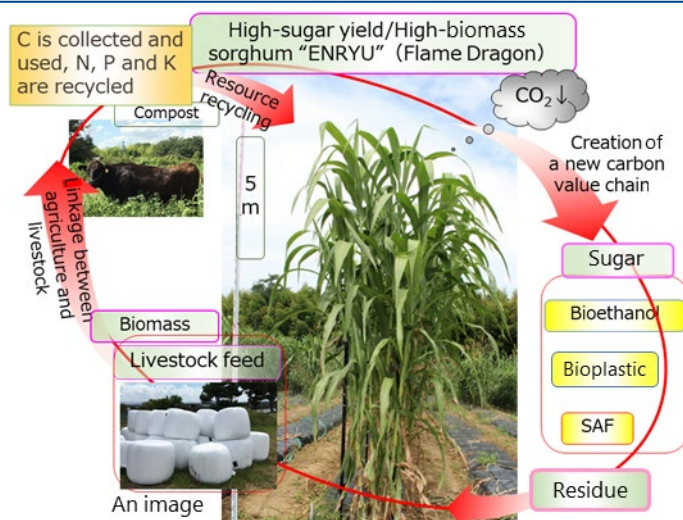


Fig. 2. ENRYU, a new F<sub>1</sub> sorghum variety with a high sugar yield and high biomass. It shows potential for cascade use, where the extracted sugar is used for energy and the residue for livestock feed.

Technical Details:



1) [https://www.jst.go.jp/pr/jst-news/backnumber/2023/202305/pdf/2023\\_5\\_p8-11.pdf](https://www.jst.go.jp/pr/jst-news/backnumber/2023/202305/pdf/2023_5_p8-11.pdf)

2) (License: CC BY 4.0) <https://www.nature.com/articles/s41598-021-84020-3>

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