

Desiccation Tolerance-Related Genes Derived from Mongolian Steppe Plants

We are looking to out-license the technology for its commercialization.

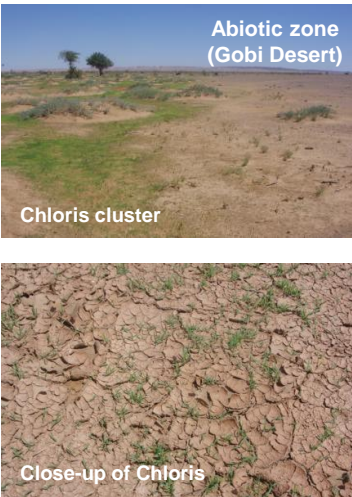
Novel genes found to enhance desiccation stress tolerance useful for the production of plants capable of growing in harsh environments

◆Background

Climate change, driven by global warming, is reducing arable land and accelerating desertification, worsening declines in crop yields and green spaces. The development of plants and crops capable of growing in arid lands and other harsh climatic conditions is expected to provide a solution to these challenges.

◆Description

The Mongolian Gobi Desert region experiences extremely dry conditions, with an annual precipitation of only 50mm, and is subjected to harsh climate conditions, with temperatures dropping below -20°C in winter. The research team identified a novel group of genes induced by desiccation stress from *Chloris virgata* (*Chloris*), which thrives in extreme abiotic conditions in harsh arid regions (Fig.1). These novel genes confer desiccation stress tolerance to plants as shown in the gene-introduction experiments with the model plant *Arabidopsis thaliana* (Fig. 2).



◆Development Status

- Technology Readiness Level: 2
- Identified the novel desiccation tolerance genes (Fig.1)
  - Confirmed the high fresh weight retention in plants overexpressing the found gene after drying treatment (Fig.2)
  - Ongoing experiments with grain plants to evaluate the desiccation tolerance enhancement by the novel gene introduction

◆Applications

- Breeding and production of plants and crops that can thrive in arid regions

◆Offer

- Patent License
- Option for Patent License
- Collaborative Research
- MTA (provision of plasmid)

◆Contact

TLO-KYOTO Co., Ltd.

Mail: event@tlo-kyoto.co.jp  
Phone: +81-75-753-9150

Level 3, International Science Innovation Bldg., Kyoto University, Yoshidahonmachi, Sakyo-ku, Kyoto 606-8501, Japan



IAC Institutional Advancement and Communications  
KYOTO UNIVERSITY

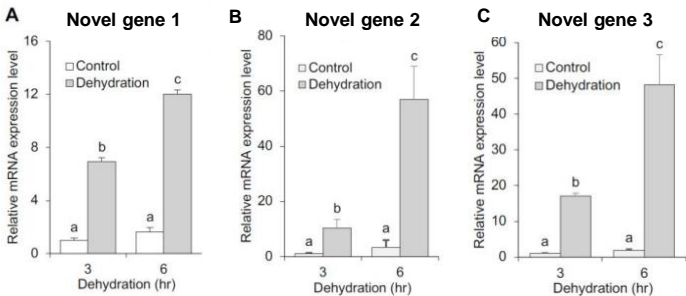


TLO-KYOTO

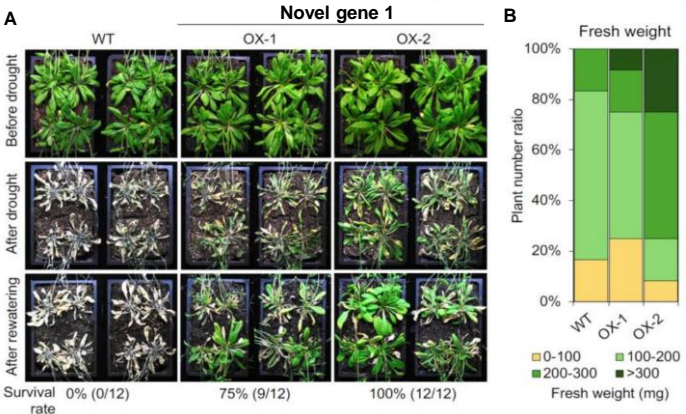
➢ Identification of novel genes contributing to desiccation stress tolerance

It is predicted that the genes activate desiccation stress tolerance signaling pathways to stimulate the biosynthesis of related hormones.

➢ Desiccation stress-tolerant recombinant obtainable simply by the gene introduction to plants other than *C. virgata*



**Fig.1 The expression level of the novel genes 1, 2 and 3 under the dehydrated condition**  
The mRNA expression levels of the novel genes 1, 2 and 3 were significantly increased both at 3 hours and 6 hours after the dehydration treatment.



**Fig.2 The desiccation stress tolerance of the recombinant *Arabidopsis thaliana* (OX-1, OX-2) overexpressing the novel gene 1**  
A: After the dehydration and the re-irrigation, the survival rate of the wild-type (WT) group remained 0%, while that of the novel gene 1-overexpressing groups (OX-1 and OX-2) was 75% and 100%, respectively.  
B: The fresh weights of OX-1 and OX-2 were more than that of WT.