

Japan

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Please describe any new experimental resources and/or software tools available to Arabidopsis researchers that have been initiated or funded in your country in 2020 or early 2021

RIKEN National Science Institute

- Center for Sustainable Resource Science (CSRS) (<http://www.csrs.riken.jp/en/>).
- PRIME Platform for RIKEN Metabolomics (<http://prime.psc.riken.jp/>).

Arabidopsis metabolomics platform publicly available platform resources:

- Widely targeted metabolomics (in Drop Met, <http://bit.ly/2HU2ACI>) • AtMetExpress Arabidopsis metabolome expression database (<http://bit.ly/1P2YByw>)
- LC-MCS Branch (<http://bit.ly/1P2Zhnt>) PRIME Web Applications
- MeKO Metabolite Profiling Database for Knock-Out Mutants in Arabidopsis (MeKO) (<http://bit.ly/1QQBWYI>)
- PRIMELink integrates 3 above databases (AtMetExpress, MS2T and ReSpect) for bi-directional search from gene or metabolite (<http://bit.ly/1RCX4Bc>)
- ReSpect RIKEN MSn Spectral database for phytochemicals (<http://bit.ly/1P2Zalv>)
- HiFi Heteroatom-containing Ion Finder (<http://bit.ly/1nBxjJ6>)
- PlaSMA Plant Specialized Metabolome Annotation (<http://plasma.riken.jp/>) Distribution and Redistribution
- Drop Met mass-spec based metabolome analyses (<http://bit.ly/1LVEfwq>)

Other RIKEN CSRS developed tools and resources:

- AtGenExpress Arabidopsis Gene Expression profile database (<http://bit.ly/1P2YT8v>)
- KNApSack Comprehensive species-metabolite relationship database (<http://bit.ly/1LfFkyZ>) (NAIST)
- Plant-PrAS (Plant-Protein Annotation Suite) database of physicochemical and structural properties, and novel functional region in plant proteomes (<http://plant-pras.riken.jp/>)
- MassBank Public repository of mass spectral data for sharing spectra among research communities (<http://www.massbank.jp/en/about.html>)

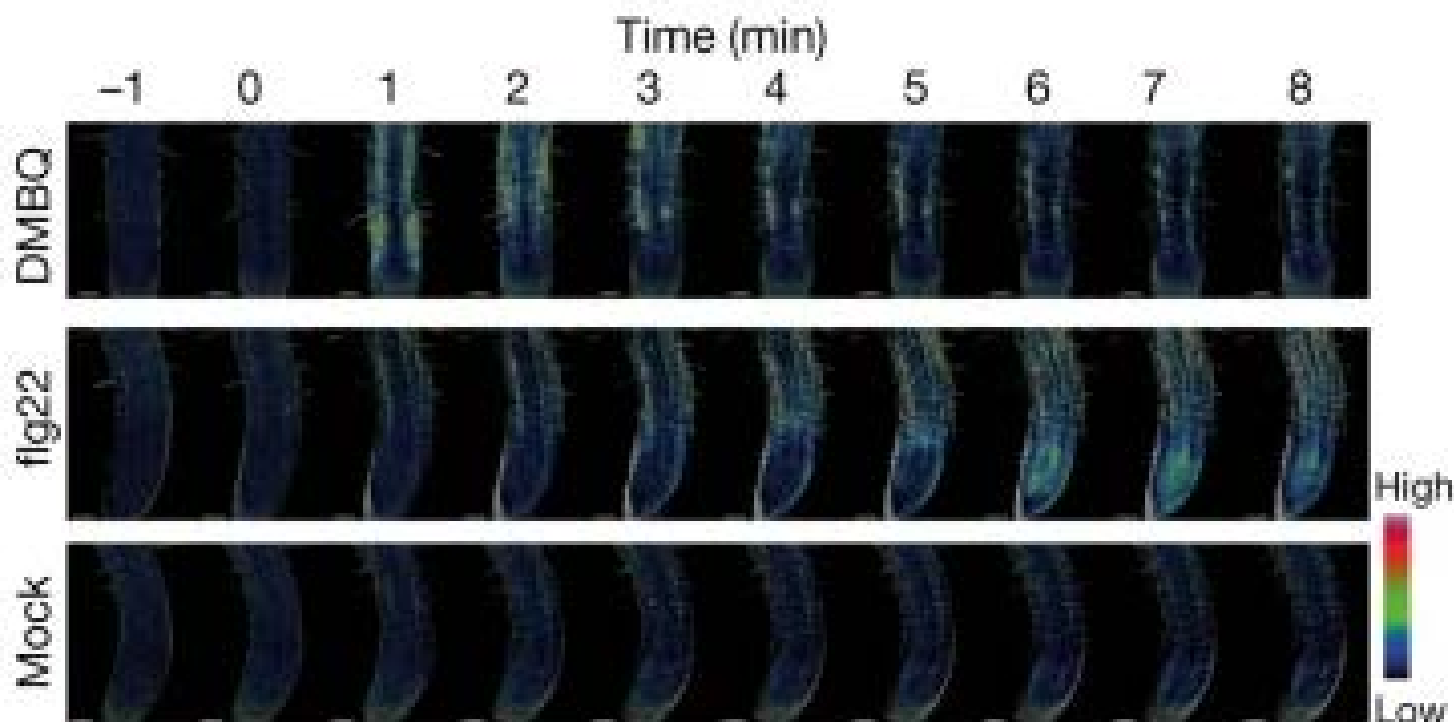
- Plant-PrAS (Plant-Protein Annotation Suite) (<http://plant-pras.riken.jp/>)
- RIPPS (RIKEN Plant Phenotyping System) (<https://academic.oup.com/pcp/article/59/10/2030/5043525>)
- The Chloroplast Function Database III (<https://plant.rtc.riken.jp/color/c/index.html>)_Arabidopsis nuclear-encoded chloroplast protein mutant seeds(<https://epd.brc.riken.jp/en/archives/4909>)
- Arabidopsis sORF Database HanaDB-At (<http://hanadb01.bio.kyutech.ac.jp/hanadb-at/>)
- Hormone-like peptides in Arabidopsis (<http://hanadb01.bio.kyutech.ac.jp/peptide/>)
- Hormonome platform and RIKEN Plant Hormone Research Network_(<http://hormones.psc.riken.jp/>)
RIKEN National Science Institute - BioResource Research Center (BRC) (<https://epd.brc.riken.jp/en/>)
- Arabidopsis seeds, cDNA, and plant cultured cells: Exp-Plant catalog (<https://plant.rtc.riken.jp/resource/index.html>) • Resource information (<https://epd.brc.riken.jp/en/>)
- National BioResource Project (<http://nbrp.jp/index.jsp>)

Kazusa DNA Research Institute (<http://www.kazusa.or.jp/e/>)

- KOMICS Kazusa Metabolomics Database portal (<http://www.kazusa.or.jp/komics/en/>)
- MassBase: a plant metabolome database (<http://bit.ly/1Rlf9Dd>)
- MS-MS Fragment Viewer database (<http://bit.ly/1QWjPUm>)_Plant GARDEN Plant Genome And Resource Database ENtry (<https://plantgarden.jp>)
- PGDBj Plant Genome DataBase Japan (<http://pgdbj.jp/?ln=en>)
- Kusaki DB: a database to assess existence and completeness of orthogroups in plant species(<http://pgdbjsnp.kazusa.or.jp/app/kusakidb>) (<https://hub.docker.com/r/ghelfi/kusakidb>)_KaPPA-View4 for integration of transcriptome and metabolome data on metabolic maps (<http://kpv.kazusa.or.jp/>)
- CoP: a database for plant co-expressed gene network (<http://webs2.kazusa.or.jp/kagiana/cop0911/>)
- RnR: a database for regulatory network in T87 cultured cells of *Arabidopsis thaliana* (<http://webs2.kazusa.or.jp/kagiana/rnr0912/indexff.htm>)

National Institute for Basic Biology (<http://www.nibb.ac.jp>)_nekko: a portal site for *Rhizophagus irregularis* genome (<http://nekko.nibb.ac.jp>)

- Japanese Morning Glory Genome Database: (<http://ipomoeanil.nibb.ac.jp>)_The Plant Organelles Database 3: (<http://podb.nibb.ac.jp/Organellome/>)_PHYSCObase: (<http://moss.nibb.ac.jp/physco.html>)



[Ca²⁺]_{cyt} dynamics in the root of Arabidopsis seedlings expressing R-GECO1, in response to 5 μM DMBQ, 1 μM flg22 or dimethyl sulfoxide (DMSO) control. A montage of fluorescence images was obtained from Supplementary Videos 1–3. Kymographs are in Extended Data Fig. 1. Scale bars, 50 μm.

Please provide a paragraph describing the general impact of the COVID19 pandemic on the scientific community in your country

COVID19 has greatly affected our research in terms of style and activity. Although we did not get into full-lockdown in Japan, plant science-related annual meetings (Botanical Society of Japan, Japanese Society of Plant Physiologists, Japanese Society for Plant Biotechnology, etc.) were postponed or held online. Researchers have explored the new research style using web communication under the pandemic of COVID19.

Planned events for 2021 and 2022

- Mar. 14-16, 2021: 62rd Annual Meeting of Japanese Society of Plant Physiologists (on line meeting). Matsue. (https://jspp.org/annualmeeting/62/e_greeting.php)
- May 28 2021: International RIKEN Symposium on Sustainable Resource Science “Hope for the Future” (on line meeting)
- Dec. 13-16, 2021: Cold Spring Harbor Asia Conference “Integrative Epigenetics in Plants”, Awaji Yumebutai Conference Center- Mar. 22-24, 2022: 63rd Annual Meeting of Japanese Society of Plant Physiologists. Tsukuba.

Selected Publications

- Laohavisit, A., Wakatake, T., Ishihama, N., Mulvey, H., Takizawa, K., Suzuki, T. and Shirasu, K. "Quinone perception in plants via leucine-rich-repeat receptor-like kinases", *Nature* 587, 92–97. Doi: 10.1038/s41586-020-2655-4

Identification of a novel leucine-rich-receptor-like kinase provides insights into the role of quinone signalling for the haustorium formation in parasitic plants and for plant immunity in nonparasitic plants.

- Notaguchi M, Kurotani KI, Sato Y, Tabata R, Kawakatsu Y, Okayasu K, Sawai Y, Okada R, Asahina M, Ichihashi Y, Shirasu K, Suzuki T, Niwa M, Higashiyama T.(2020) Cell-cell adhesion in plant grafting is facilitated by beta-1,4-glucanases. *Science* 369, 698-702. doi: 10.1126/science.abc3710

Surprising ability of tobacco in hetero-grafting and its molecular mechanism were shown, providing huge impact both in basic and applied biology

- Kidokoro, S., Hayashi, K., Haraguchi, H., Ishikawa, T., Soma, F., Konoura, I., Toda, S., Mizoi, J., Suzuki, T., Shinozaki, K. and Yamaguchi-Shinozaki, K. "Posttranslational regulation of multiple clock-related transcription factors triggers cold-inducible gene expression in Arabidopsis", *Proc. Natl. Acad. Sci. USA* 118, e2021048118 Doi:10.1073/pnas.2021048118

Elucidation of the mechanisms of DREB1 expression in response to cold stress provides huge impact both in basic and applied plant stress biology.

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ERATO of Japan Science and Technology Corporation (<https://www.jst.go.jp/erato/en/index.html>)

MIRAI Program of Japan Science and Technology Corporation (<http://www.jst.go.jp/mirai/jp/about/index.html>) Strategic International Cooperative Program (SICORP)

JST-NSF Joint Research Project. (<http://www.jst.go.jp/inter/english/sicorp/index.html>) "Impulsing Paradigm Change through Disruptive Technologies" (ImPACT) (<http://www.jst.go.jp/impact/en/outline.html>)

MEXT "Cross-ministerial Strategic Innovation Promotion Program" (SIP) in 2014. (<http://www.mext.go.jp/english/topics/1345957.htm>)

PRESTO of Japan Science and Technology Corporation (<https://www.jst.go.jp/kisoken/presto/en/index.html>) Moonshot Research and Development Program (<https://www8.cao.go.jp/cstp/english/moonshot/top.html>)

New Zealand

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Please provide a paragraph describing the general impact of the COVID19 pandemic on the scientific community in your country

At the end of March 2020 New Zealand went into lockdown for approximately seven weeks in response to COVID19. During this time most research institutes closed with only essential maintenance work permitted and researchers and students required to work from home. Following this lockdown, community transmission of COVID19 has remained low in New Zealand and research institutes have been open. However, the Auckland region saw two outbreaks requiring a return to lockdown for 1-2 weeks in August 2020 and February 2021, closing research institutes in Auckland, while institutes in the rest of the country remained open, but with some restrictions.

The research community has also been impacted by the cancellation of at least one funding round, restrictions on international travel imposed by many research institutions and restrictions on international researchers entering New Zealand. Additionally, there has been delays on the delivery of consumable items and equipment from international suppliers.

Planned events for 2021 and 2022

- Plant Science Central Conference, July 6-8 2021, Palmerston North, New Zealand. In-person event planned with some virtual presentations for international speakers.
- Queenstown Research Week including a satellite in Applied Genetics in Breeding Technologies, Aug 30 to Sept 2 2021, Queenstown, New Zealand
- 16th congress of the Federation and Asian and Oceanian Biochemists and Molecular Biologists (partnering with the New Zealand Society of Plant Biologists), November 22-25 2021, Christchurch, New Zealand. In-person event planned with some virtual presentations for international speakers.
- International Congress on Photosynthesis Research; August 6th-12th 2022, Rotorua Energy Events Centre <https://www.photosynthesis-research.org/ispr-news/asia-oceania/2019/international-congress-on-photosynthesis-research-2020/>

Selected Publications

These articles highlight the diverse research using Arabidopsis that occurs in New Zealand.

1. Miebach, M., Schlechter, R.O., Clemens, J., Jameson, P.E. and Remus-Emsermann M.N.P. (2020) Litterbox-A gnotobiotic zeolite-clay system to investigate Arabidopsis-microbe interactions. *Microorganisms* 8, 464. <https://doi.org/10.3390/microorganisms8040464>

This manuscript describes a new soilless medium with improved aeration compared to an agar-based medium and reduced cross-contamination between phyllosphere and rhizosphere to support studies into plant-microbe interactions.