

**The 17th Resource Committee of Experimental Plants
Evaluation and Suggestions**

(March 5, 2019)

Division/Team Name: Experimental Plant Division

Division Head: Masatoshi KOBAYASHI, Head

1. Achievements and plans for the Division

(1) Have the current achievements reached the standards of those made by the major international bioresource centers?

- The Division is functioning as an important international center for the distribution of the seeds of *Arabidopsis* and some other experimental plants, various culture cell lines, genetic resources and vectors. In particular, following the Nagoya protocols, it can be expected that obtaining resources from foreign countries will become more difficult. Accordingly, the significance of this center's presence may well continue to increase.
- Regarding *Arabidopsis* resources, RIKEN BRC Experimental Plant Division developed rapidly during the 3rd Mid- to Long-Term Period. Consequently, a position of the Division was established ranking alongside with the Arabidopsis Biological Research Center (ABRC) and Nottingham Arabidopsis Stock Centre (NASC).
- Without doubt, strict quality control of resources by the Division meets the world's highest standards. The thoroughness of quality control of seed resources is worth mentioning. Moreover, the Division is managing data-related resources through a public database. It is particularly valuable that the Division is providing beneficial advice to users, such as proposals for alternative clones.
- Development and distribution of cultured cell lines and vectors necessary for genome editing are effective measures for future resource use. They are being managed appropriately.
- Although it appears that jasmonic acid reduces thrips by improving defenses, the other result also suggests that there may be a small number of thrips resistant to jasmonic acid. Therefore, in the future, it will be necessary to come up with measures for resistant thrips.

(2) Have sufficient achievements been made for contributing to society and to the research community within Japan and overseas?

- The preservation and distribution of various resources is the most significant contribution to Japanese and international research communities. The Division plays an important role in preventing the loss of important experimental materials which can happen by transfer or retirement of researchers, or termination of projects.
- The Division has made a particularly large contribution to the research community by the preservation and distribution of unique and excellent resources. These include domestically developed *Arabidopsis*-related resources and, moreover, BY-2 and *Arabidopsis* T87 cultured cells. These contributions are now linked to the worldwide presence of Japanese research standards. Arguably, the Division also contributes to society by increasing Japan's standing as a nation of science and technology.
- Experimental plants have become attractive resources for researchers in agriculture.
- The provision of resources from the Division has led to research results published in leading journals such as *Nature* and *Science*. This indicates the achievements of the resource center's main role.
- Information of Ds insertion site and partial sequence of introduced gene insert in FOX lines are extremely useful for users.
- As biology becomes increasingly significant to secondary education, the distribution of educational resources plays a vital role. In fact, the importance of this outreach may exceed that of distributing materials to universities.

(3) Are current activities and plans based on the results of the 3rd Mid- to Long-Term Plan or the achievements in the previous position? Are they in line with the BRC's 4th Mid- to Long-Term Plan (7 years from 2018 to 2024)? Are they appropriate and do they contribute to the development of the center?

- The Division's plans are also appropriate from the perspective of the center's development. Of particular note is the thoroughness of their genetic resource quality control. This is a superb bioresource project of which Japan can be proud.
- The future plan is appropriate, given the status of various efforts including: 1) the consolidation of resource information for plant culture cells, 2) the maintenance of a web catalogue integrating the data of resources, and 3) the maintenance of *Brachypodium distachyon* resources, which contributes to research on plant-microorganism symbiosis. Collaboration with the center's new team is also planned.

- It is desirable that the Division should show how basic plant science research will be linked to the output of applied research. However, this may be a difficult task for the study of plant-microbe symbiosis alone. A plan of actively leading researchers in the agricultural and bioengineering fields to handle *Brachypodium distachyon* is desirable.
- Although the use of *Brachypodium distachyon* is intended to be a bridge to applied research, it is nevertheless important to appeal to user groups which are quite different from the *Arabidopsis* users. At the present time, it remains unclear how this outreach should proceed.

(4) What are resources to be developed and research/ technological development to be undertaken in addition to those currently planned in the initial 4th Mid- to Long-Term Plan?

- Sufficient plans are in place. Implementation of these plans is of primary importance.
- It may be necessary to expand to other plant resources, especially to crop resources. As the age of model organism-focused research appears to end, strategic planning of increasing resource capacity seems worthwhile. Research demand for Japan-specific crop resources may increase in the future.
- Liverwort may be taken up as a resource. Japan has led technology and strain development of liverwort as a model plant. At present, liverwort-related researches are increasing among the Botanical Society of Japan and the Japanese Society of Plant Physiologists. Many mutants, CRISPR and genetically modified strains have been developed in Japan. Active use of liverwort is also expanding in Europe.
- Strengthening of dissemination of useful, and detailed resource-related information is desirable. It would also be beneficial to conduct joint research more closely.
- At present, the Division should focus on improving the quality of resources that they currently have and not on developing novel resources. Quality improvements include the preparation and dissemination of information. Moreover, the Division should be sensitive to the needs of the research community. There may lie the seeds of new resource development.

2. SWOT analysis

(1) Are the results of the presented SWOT analysis valid?

- It is adequate.
- Contributions to education should also be examined.

(2) Are the countermeasures for the results of the SWOT analysis appropriate?

- The strengths of the analysis results are fully utilized.

- Information dissemination program of this Division is considered to be a weakness. The Division has made much effort. The plan to make things advance, for example, reviewing website contents, will be a big future issue.
- Technical training may also become an important contribution.
- It is necessary to investigate tactics for future budget reductions.

3. International collaboration

(1) Is the international collaboration being actively addressed, and is the Division functioning as a hub of international scientific technology?

- As an international hub for the supply of experimental materials, the Division is actively distributing to overseas. Information is also being disseminated in English, and is considered to play an important role in international collaboration.
- While the use of TAIR is becoming more restricted, this center's role regarding *Arabidopsis* remains significant to Japanese researchers.
- In the future, development of *Brachypodium distachyon* as an international material will be important.
- As a member of the Multinational *Arabidopsis* Steering Committee, the Division is strengthening collaboration with foreign resource institutions. Moreover, the Division is becoming the strongest international hub in the Japanese plant science.

4. PI assessment

(1) Is the PI fulfilling the role in line with the BRC mission?

- Dr. Kobayashi has been a powerful force in pushing the Plant Division of the BRC to its current level. It is no overstatement to say that, more than simply playing the role set out in the mission, His actions themselves have functioned as the mission.
- As Dr. Kobayashi is performing an indispensable role, the question of finding an eventual successor is a major issue.

(2) Do the PI's achievements in research and development (R&D) satisfy international standards in light of the following three aspects? (i) Results output and impact, (ii) Contribution to specific missions of each laboratory regarding research support and collaborative exchange programs within RIKEN, (iii) Pioneering new fields of research, acquisition, and commercialization of intellectual property rights, social education for science, the fusion of different fields, and social contribution

- The maintenance and distribution of resources is proceeding beyond satisfactory. The results based on this are linked to extremely important results in Japan. A satisfactory contribution is being made in accordance with the center's mission and by the development of technologies to raise the scientific level of resource distribution, and maintenance.
- Not just an institution which provides resources, the Division is also active in resource development and research promotion through close collaboration with other research institutions. The Division is making efforts to reach international standards, and the Division is generally successful.

(3) Is the PI appropriately tackling the management and operation of the Division? In addition, does the PI make efforts for training and development of young talent?

- The PI has been making sufficient efforts.
- The Experimental Plant Division is currently operating smoothly.
- Training of young staff who possess the skills necessary for resource preservation is well-promoted.
- It is desirable that talent who can diligently absorb the resource center's techniques should be developed. This is especially important due to one of the Experimental Plant Division's special characteristics; namely, high levels of quality control. Rather than accepting temporary trainees from overseas, it is desirable that the PI should train and secure young talent that can reliably carry out the Division's roles.
- In order to attract young talent, it is necessary to create a system that accounts for the career paths of young staff. Future employment should be planned for young talent.

End