

Form B-2
(FY2022)
Must be typed

Date (日付)
17/10/2022 (Date/Month/Year: 日/月/年)

Activity Report -Science Dialogue Program-
(サイエンス・ダイアログ事業 実施報告書)

- Fellow's name (講師氏名): DASPUTE ABHIJIT ARUN (ID No.P21403)

- Name and title of the lecture assistant (講義補助者の職・氏名)

Ms.Fukagawa

- Participating school (学校名): Seifunakai High School

- Date (実施日時): 08/10/2022 (Date/Month/Year: 日/月/年)

- Lecture title (講義題目):

Study of Boron and Arsenic transport in Arabidopsis thaliana

- Lecture format (講義形式):

◆ Onsite ・ Online (Please choose one.) (対面 ・ オンライン (どちらか選択ください。))

◆ Lecture time (講義時間) 40 min (分), Q&A time (質疑応答時間) 60 min (分)

◆ Lecture style (ex.: used projector, conducted experiments)

(講義方法 (例: プロジェクター使用による講義、実験・実習の有無など))

Used projector

- Lecture summary (講義概要): Please summarize your lecture within 200-500 words.

Boron (B) is an important micronutrient for the plant Among the 17 essential elements and it is required for structure of pectin in cell wall. B deficiency and toxicity are both major agricultural problems worldwide. Using the model plant Arabidopsis thaliana, 2 types of B transporters facilitating boron transport across the plasma membrane (PM) have been identified. Under low B conditions, a boric acid channel, NIP5;1, and a borate exporter, BOR1, are required for efficient B uptake into roots and subsequent translocation toward shoots (Takano et al. 2002; Takano et al. 2006).

Arsenic (As) is a toxic metalloid present in the soil. It is a very serious problem for human health when accumulated in the plants. As contamination in the ground water and food is a serious problem for several Asian countries like Bangladesh and India. Also, the consumption of rice and rice products contributed to 64 % of the dietary exposure to inorganic As among the 14 food category tested in the 10 region across the Japan (Suzuki et al., 2022). In the previous studies, two As-transporters; PvACR3 and PvACR3;1 were isolated from As hyper-accumulator fern

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(*Pteris vittata*). In transgenic *Arabidopsis* plants the PvACR3-GFP localized to the plasma membrane (PM) and showed As efflux for xylem loading (Chen et al., 2013). Also, PvACR3;1-GFP protein localized to the vacuolar membrane and showed As sequestration into vacuoles (Chen et al., 2017). We have previously reported that the N-terminal cytoplasmic region of NIP5;1 is important for the polar localization in the PM towards soil side of root epidermal cells. In the present study, we aimed to create an *Arabidopsis* transgenic plant that can actively excrete arsenic to the outside of the root by expressing and localizing the As-exporter on the soil-side PM of the epidermal cells. The N-terminal regions of PvACR3 and PvACR3;1 were replaced with the N-terminal cytoplasmic region of AtNIP5;1 and the chimeric GFP-fusion constructs were expressed under the control of the AtNIP5;1 promoter. The confocal imaging revealed the localization of GFP-AtNIP5;1Nter-PvACR3;1 to the PM in the epidermal cells. We are analyzing As excretion from root and As accumulation in shoot of the transgenic plants. We are expecting the less As accumulation and translocation in root and shoot respectively.

◆Other noteworthy information (その他特筆すべき事項):

Seifunankai High School has a English teacher and he also attended the lecture and he also helped me during question and answer section.

- Impressions and comments from the lecture assistant (講義補助者の方から、本事業に対する意見・感想等がありましたら、お願いいたします。):

Ms.Fukagawa- san has helped me during the question and answer section. She is good English speaker so she understands my lecture contents and she translated to the students when students asked some questions.