

Public-friendly Access to Genome Editing as a New Plant Breeding Techniques

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1. Introduction

Although the crop science using the New Plant Breeding Techniques (NBT) has progressed around the genome editing both home and abroad, its usage remains unstandardized among countries. Reflecting this situation, Japanese government agencies are deploying their efforts for diffusion of NBT-relevant knowledge. For example, the Ministry of Agriculture, Forestry and Fisheries (MAFF) has just released one bulletin, "Towards the development and practical application of crops using NBT such as genome editing" to report international condition of NBT operations. Also in 2014, the Cabinet Office launched the NBT social application project as part of Strategic Innovation Creation Program (SIP). And here at "Life & Bio Plaza 21", as one sphere of the SIP, we now have the shared responsibility of dispersing information related to the NBT. In today's presentation, we report on the outcome and feedbacks as to our recent works, including the creation of easy-to-follow handouts and organization of workshop programs.

2. Education Contents and Operational Direction

Before beginning our operation described above, we set up an information exchange session among a variety of persons involved (see Fig.1), closely scrutinized their opinions and perceptions, and determined the education contents and operational direction based on them.

<Education Contents>

- To concentrate on the genome-editing without keeping a lot of irons in the fire (see Fig.2).
- To provide an overview of historical contexts besides the technical description.
- To clarify the location of the genome-editing and the difference between the genome modification.
- To show general benefits from the NBT, such as contribution to solving the global food problem.

<Operational Direction>

- To include experts' opinions and contemporary psychological observations in our handouts and/or workshop programs.
- To improve overall usability of our tools/programs for outreach training instructors.

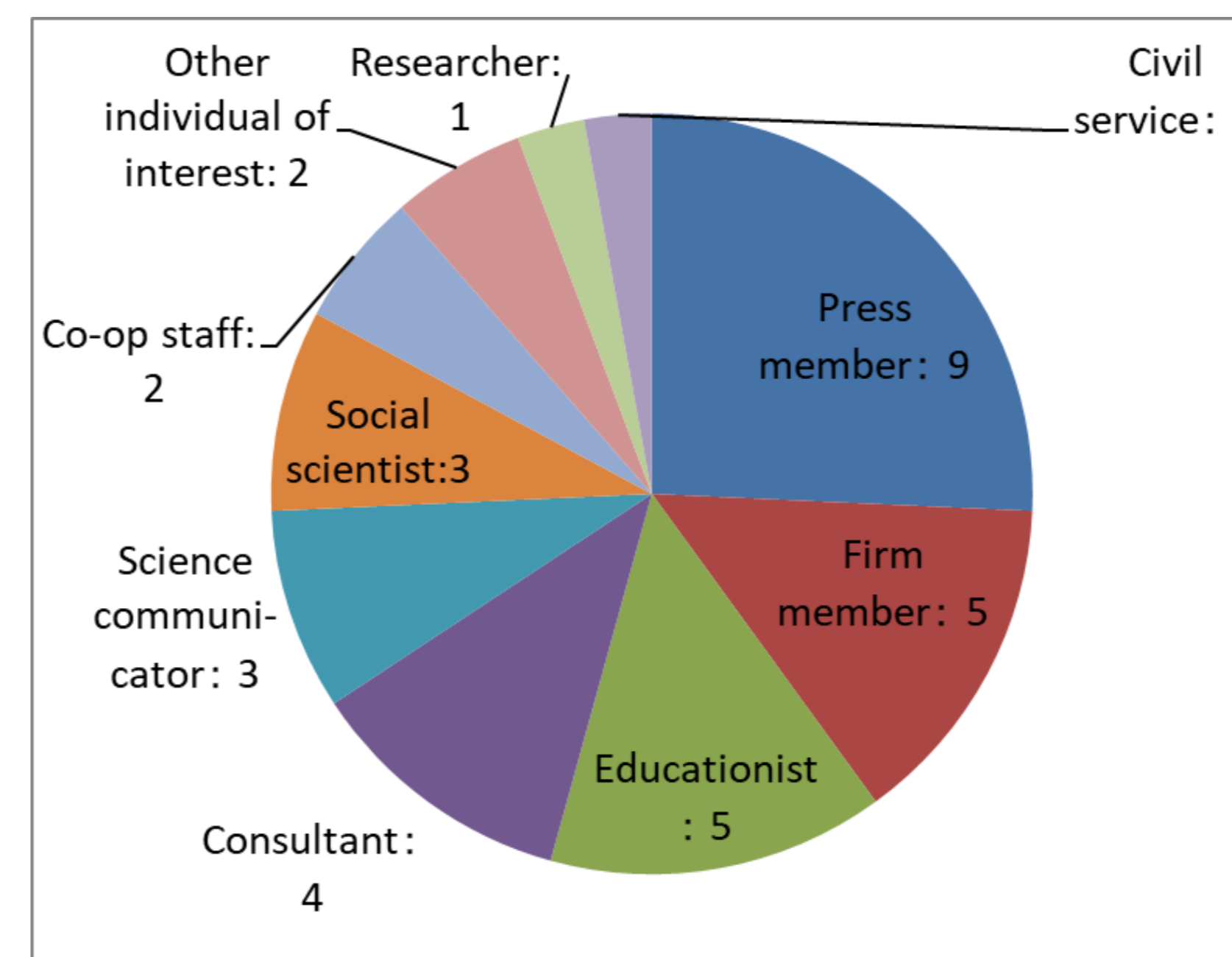


Fig.1 Headcount of contributors to information sharing

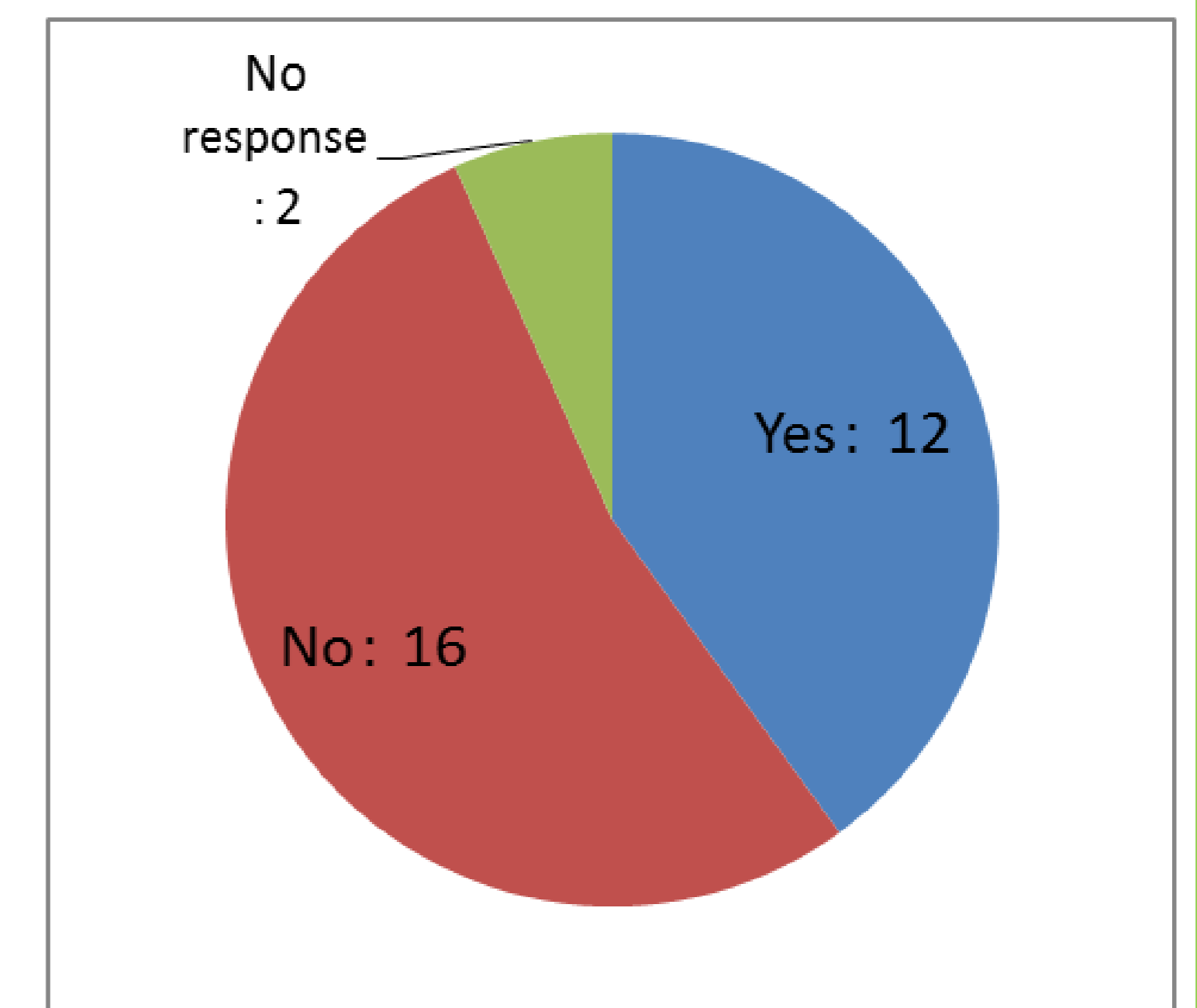


Fig.2 Experts' opinion: "Should we concentrate on Genome Editing?"

3. Hypothesis about Relationship of Trust

We built a hypothesis on "configuring the relationship of trust at our work site" in reference to the theory by Yamagishi T*. Our hypothesis indicates that the relationship of trust can arise in the society where the "credit to information provided by experts" and "confidence in others acquired via communication" co-exist. In our operation, the former is attainable at a media briefing where comprehension of advanced knowledge is counted, and the latter, at a science cafe where the easy-to-follow communication method matters most (see Fig.3).

*Yamagishi T. (1999), *From Secure Society to Trust Society*, Chukoshinsho

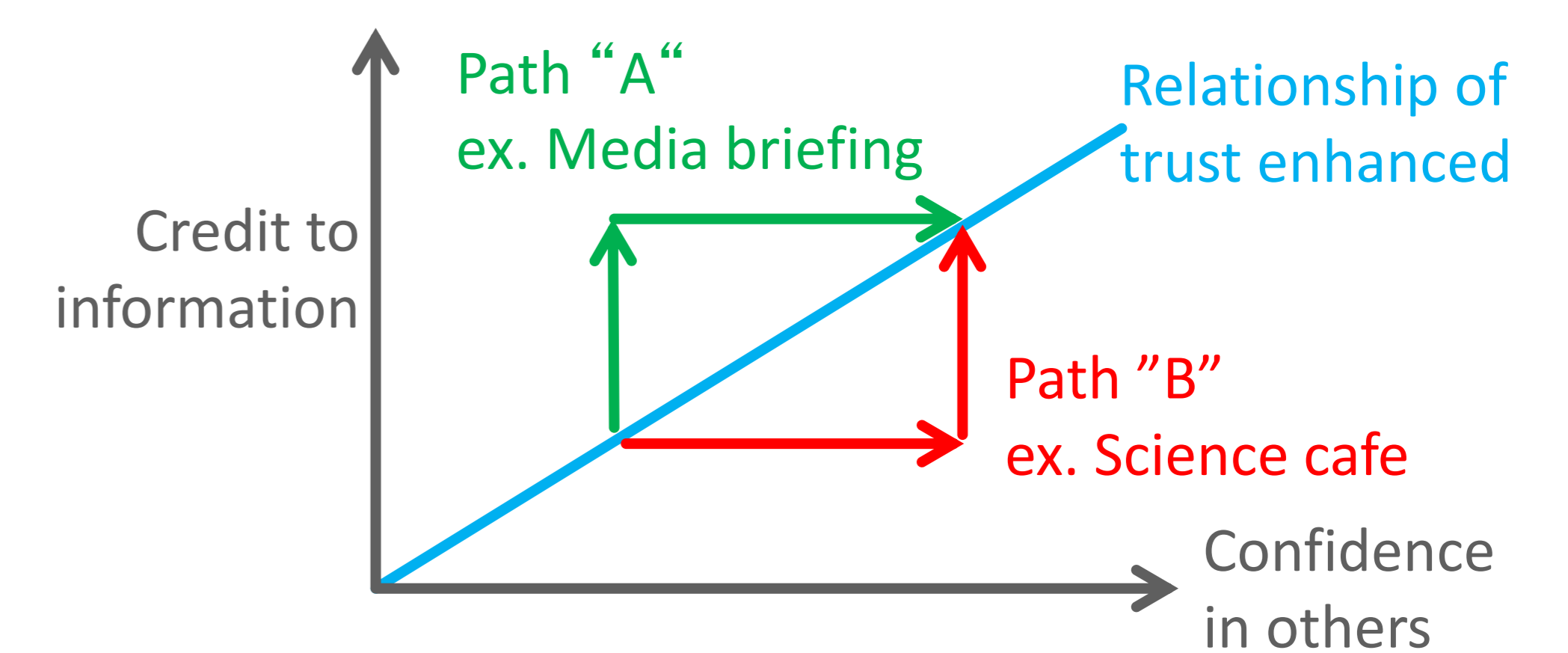


Fig.3 Relationship of trust enhanced

4. Outcome and Feedbacks

(1) Easy-to-follow Handouts

We prepared an easy-to-follow handouts that consists of three parts: "What is the plant breeding?", "Difference between genome modification and genome editing" (see Table 1), and "Practical use of genome editing: prospects and issues". We received positive feedbacks from housewives who listened to our explanation by use of our handouts.

(2) Workshop program

We have implemented several workshops with a view to laying the groundwork for public awareness toward NBT. One of the successful workshops was "Guess what vegetable: using seeds and flowers' pictures"(see Fig.4). In our questionnaire survey conducted after the workshop, many of the participants, especially scientific-minded ones, gave positive reviews to NBT (see Fig. 5).



Fig. 4 Workshop "Guess what vegetable: using seeds and flowers' pictures"

Table 1 Comparison between genome modification and genome editing.

	Genetic Modification	Genome Editing
Objective	To use other creature's gene (introducing new blueprint)	To modify target genes (partially editing blueprint)
Comparison to traditional breeding	Different: producing new creature on genetic level	Identical: producing new creature on individual organism level
Survivability of foreign genes	possible	null

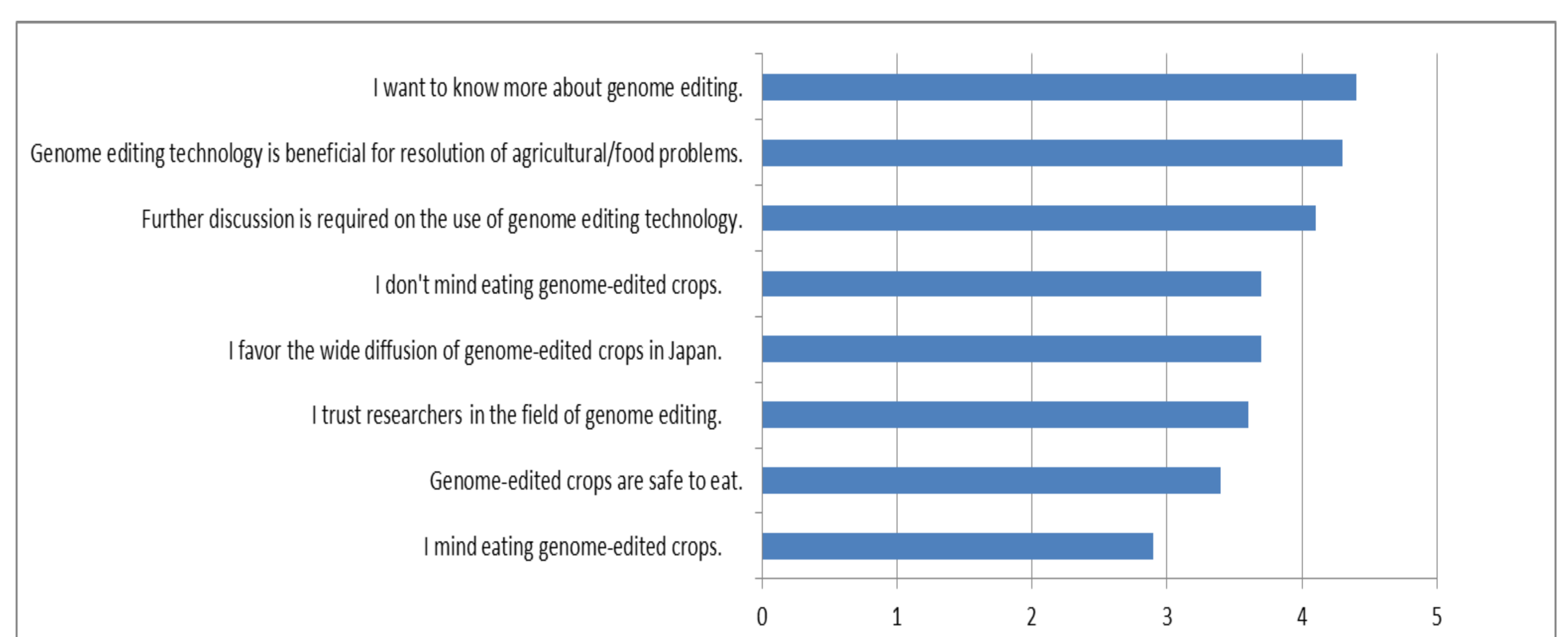


Fig.5 Questionnaire result at workshop: Average when "most applicable=5" and "least applicable=1" (N=112)

6. Future Plan

- To provide further enhanced handouts on the NBT or genome editing with visual updates for the outreach trainings/science cafes.
- To offer many more opportunities to the school students or museum visitors for "learning-through-doing" via our workshop programs.
- To create more attractive events for the people who lack interest in the science, and to explore a new information network for them.
- To improve the informational environment surrounding the NBT so that people can come to deepen their understanding of genome-editing and to buy NBT-derived crops as reliable products at ease.