



IC PROJECT REPORTING TEMPLATE AS PART OF THE STRATEGY AND PROCESS ON HOW THE IC REVIEWS AND ANALYSES ICD PROJECTS

Project Title: Realization of zero pest damage agriculture by making full use of advanced physical methods and unused biological functions (IPM research to develop non-chemical pest controls)

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Project Code (if applicable): NA

1. Project Profile	
Recipient Region(s)/ Countries	Potential benefits in all countries from the research outcomes
Donor/ Resource Partner	Bio-oriented Technology Research Advancement Institution (BRAIN), Japan
Collaboration / Participating Organizations	Kyoto University, National Agriculture and Food Research Organization (NARO), Tohoku University, Osaka University, Tokyo University of Agriculture and Technology (TUAT), Setsunan University, The Jikei University School of Medicine, Tokyo University of Agriculture (As a Funding Agency, BRAIN manages the progress of the research project under the supervision of the Cabinet Office of the Ministry of Agriculture, Forestry and Fisheries)
Project Budget (detailed funds and/or in-kind)	6 million USD
Project Timing	Dec. 2020 to Mar. 2025 (could be extended)
2. Summary of Project (Scope, Relevance to the IPPC, Main outputs, Success and challenges)	
<ul style="list-style-type: none"> This is one of the projects identified under the National Program "Moonshot R&D", more specifically its GOAL 5 (Creation of the industry that enables sustainable global food supply by exploiting unused biological resources by 2050). The purpose of this project is to build a new pest management system with substantially less chemical pesticide use. The system includes three steps: (1) the sterile insect technique, which reduces the pest density over a wide area with symbiotic microorganisms, (2) laser beam shooting technique, which targets flying pests, and (3) mixed technique (surface irradiation of lasers and function enhancement of biological control agents (BCAs)), which targets minute pests as well as those pests that escaped from laser shooting. These methods will be effective to newly emerged arthropod pests, such as invasive species. The methods will be also useful when pest distribution will expand due to climate change. 	

<ul style="list-style-type: none"> • Thus, this project contributes to the implementation of at least two Strategic Objectives of the IPPC Strategic Framework for 2020-2030: A. Enhance global food security and increase sustainable agricultural productivity, and B. Protect the environment from the impacts of plant pests. • As an initial outcome of the project, the prediction system of flying insects has been developed by AI technologies, which is essential for the laser shooting. New genome editing method and RNA interference (RNAi) systems on BCAs have been also developed, which are required for genome information-based breeding and elucidation of BCAs function.
<p>3. Project Supporting Materials <i>[e.g. hyperlinks]</i></p>
<p>Project description (BRAIN website): https://www.naro.go.jp/laboratory/brain/moon_shot/MS_PM_E05.pdf</p> <p>Goal 5 of Moonshot R&D (BRAIN website): https://www.naro.go.jp/laboratory/brain/english/moon_shot/index.html</p> <p>Moonshot R&D (Cabinet Office website): https://www8.cao.go.jp/cstp/english/moonshot/system_en.html</p>
<p>4. List project technical resources (i.e. guides, training materials, tools) that could be useful and used by other stakeholders</p>
<p>Press release (NARO, 7 Dec. 2021): https://www.naro.go.jp/english/laboratory/nipp/press/3d/index.html</p> <p>News article (Nikkei Asia, 31 Dec. 2021): https://asia.nikkei.com/Business/Technology/Japan-tech-predicts-bugs-flight-paths-to-zap-them-with-lasers</p> <p>An RNAi technique to improve predatory mites (Pesticide Biochemistry and Physiology, Vol. 180, Jan. 2022): https://www.sciencedirect.com/science/article/pii/S0048357521002248</p>
<p>5. Provide a list of project experts that could be recommended to other stakeholders and describe why</p>
<p>Norihide HINOMOTO (Kyoto Univ., Project Manager): Expert in agricultural pest management, especially biological control Masatoshi HORI (Tohoku Univ.): Expert in use of blue right for pest control Kazuhisa YAMAMOTO (Osaka Univ.): Expert in development of laser technology Ryo SUGIURA (NARO): Expert in artificial intelligence Takaaki DAIMON (Kyoto Univ.): Expert in genome editing in insects Takeshi SUZUKI (TUAT): Expert in RNAi and genome analysis in mites Daisuke KAGEYAMA (NARO): Expert in use of symbionts for pest control</p>
<p>6. List targeted beneficiaries <i>[i.e. regions, countries, RPPOs, NPPOs and other institutions]</i></p>
<p>Researchers in the similar thematic areas</p> <p>Producers all over the countries, who wish to seek environmentally sustainable pest controls</p>