RECENT RESEARCH ACTIVITIES

Joint force to battle the red imported fire ants in Japan: a multi-institution collaborative framework supported by the Ministry of the Environment

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Overview of the joint project

Discovery of red imported fire ants (hereinafter referred to as fire ant) was first reported in mainland Japan in the year of 2017. While detections of fire ant have increased since then, research effort is surprisingly limited. To prevent establishment of fire ant, a total of four Japanese research institutions, namely University of the Ryukyus, Kyoto University, Okinawa Institute of Science and Technology Graduate University (OIST), and National Institute for Environmental Studies, have teamed up to assemble a research platform that offers multiple knowledge-based strategies against future invasions of fire ant in Japan.

The role of each participating institution

Financially supported by the Ministry of the Environment, each institution is granted with 3-year funding that allows them to carry out the proposed research. The principle investigators have different yet equally important role in this team project: Prof. Kazuki Tsuji (University of the Ryukyus) is aiming to put together a novel technology of baiting that is expected to perform more efficiently than any contemporary bait products available. Dr. Kouichi Goka, (National Institute for Environmental Studies) attempts to develop an efficient, easy tool to detect and control fire ant and eventually distribute the tool, once available, nationwide to allow both early warning and rapid response possible. Dr. Yoshimura (OIST) will target on elevating public awareness of fire ant and would like to approach it by developing a citizen-science network to facilitate education, information distribution and involvement of general public into local fire ant monitoring projects.

Dr. Chin-Cheng Scotty Yang (Kyoto University) participates in the team project as principle investigator to characterize the potential impacts of pathogens (virus as focal group) on foraging behaviors of fire ant and, based on the results (which are being generated), attempts to improve the current baiting and luring systems. The virus-infected fire ants have been shown to display decreased foraging activity and a shift of macronutrient preference (from lipid/protein to carbohydrate, Figure). Consequences of such behavioral alterations include 1) use of conventional food lures may result in underestimating actual fire ant numbers; 2) current low-toxicity bait products may not be as attractive as expected. Various approaches will be tested to confirm if declined foraging patterns in virus-infected fire ants can be restored, and will be applied to develop an enhanced food lure/bait system.

Acknowledgements

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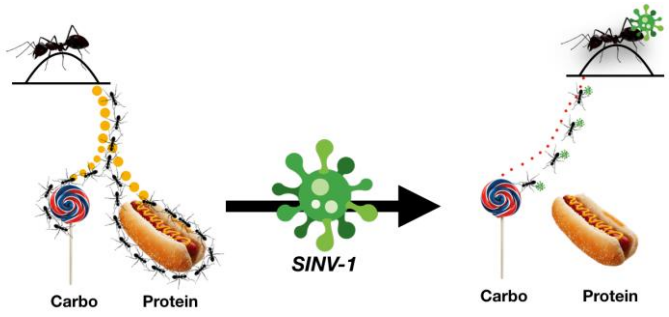

Figure. Illustrations to explain the potential impacts of the virus (SINV-1) on foraging behaviors of fire ant. Note: “Carbo” denotes Carbohydrate; the dot size corresponds to the foraging intensity.