Federal Ministry
of Food
and Agriculture

Bilateral Cooperation of BMEL with the State of Japan

IPReg: Undersowing and Intercropping for Pest Regulation in Vegetable Crops

country/countries	Germany and Japan
funding agency	Federal Ministry of Food and Agriculture - BMEL
project management	Federal Office for Agriculture and Food – BLE
project coordinator	Dr. Elias Böckmann
project partner(s)	Julius Kühn Institute (JKI) : Institute of Plant Protection and Horticulture and Urban Green (former Institute for Plant Protection in Horticulture and Forests) Institute for Biological Control National Agricultural and Food Research Organisation (NARO): Institute for Plant Protection (NARO-IPP) Tohoku Agricultural Research Center (NARO/TARC) Miyagi Prefectural Agricultural and Horticultural Research Center Aomori Prefectural Industrial Technology Research Center, Agricultural Re-

	search Institute
project budget	**70.797 €**
project duration	01.06.2022 – 31.12.2023
key words	Undersowing, barley, wheat, vegetables, pest control, natural enemies, bene-ficial arthropods
background	Undersowing has several positive functions in an agro-ecosystem. They can protect the ground from heat and erosion, fixate nitrogen, increase structural diversity and support carrying ability for vehicles. Another important factor is the influence on pest population densities due to reduced detection of the host crop, a physical barrier function against dispersal and the increase of natural enemies. The major drawback of undersowing is the potential negative impact on yield due to concurrence for water, light and nutrients with the main crop. Espe-cially in the 80s and 90s, many studies of undersowing where carried out that showed positive effects in terms of pest reduction, but the yield decrease, and management effort impeded broad implementation into prac-tice. Flowering plants can provide nectar or pollen sources for natural enemies such as predatory hoverflies or parasitic wasps. A combination of an under-sown crop with the integration of flowering plants might therefore be an even more effective method for sustainable pest control. Such combinations need to be assessed for their efficacy on pest insects as well as potential drawbacks, e.g., decline in harvest yield. All participating working groups at NARO and JKI had already expertise and experience in regard to either undersowing implementation to vegetable crops or effects of flowering plants on natural enemies. Thus, ideas of all participating parties could be connected to form new sustainable pest con-trol strategies for evaluation in field and laboratory trials.
objective	In a cooperation of NARO (Japan) and JKI (Germany), we want to test and improve measures as undersowing with wheat/barley or the introduction of insectary plants into vegetable agroecosystems (onion and cabbage) to in-crease their resilience and pest control capacity without creating negative impacts on crop yield. Horticultural crops can be severely affected by different herbivorous insect species. Although growing methods and current crop protection practice are

	different in field vegetable production in Germany and Japan, the demand for alternative pest regulation strategies is equally relevant in both countries. Adding secondary plants to the main vegetable crop in form of undersowing or intercropping that is adapted to a specific cultivation system can reduce immigration, dispersal and population growth of pest insects and can promote natural enemies. The project aims to develop and connect ideas of environmental-friendly pest regulation strategies in cabbage and Allium crop (onion, leek) production. These approaches arise from results of former joint trials in an existing collaborative project and the exchange of experience between the NARO institute in Japan and the Julius Kühn Institute in Germany. Focal points are understanding of pest suppression mechanisms of undersowing and intercropping with flowering plants as well as the cross-national comparison of those mechanisms between Germany and Japan.
short description	Field vegetable crops can be severely affected by different herbivorous insect species. Adding secondary plants to the main crop in form of undersowing or intercropping that is adapted to a specific cultivation system can reduce immigration, dispersal and population growth of pest insects and can promote natural enemies. The project aims to develop and connect ideas of environmental-friendly pest regulation strategies in cabbage and Allium crop (onion, leek) production for Germany and Japan.