Session III   Lecture 3

Breeding High-yield Soybean Varieties to Expand Production and Improve Food Processability in Japan

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Summary

Soybeans are high-quality protein and use in foods such as tofu. However, even for food purposes, self-sufficiency rate is only 23%, and yield is 1.69 t/ha, half of the 3.45 t/ha by major producers such as the United States and Brazil (2021). Therefore, improving domestic soybean yield is an urgent challenge to increase the self-sufficiency rate. High-yielding U.S. varieties were crossed with Japan's leading varieties known for superior quality. Through extensive field trials, four high-yielding varieties, namely, "Soramizuki", "Soraminori", "Soratakaku" and "Sorahibiki" were developed, demonstrating yields of approximately 3 t/ha. Additionally, they incorporate traits from U.S. varieties, such as durable resistance to bacterial pustule and pod dehiscence, contributing to stable production. However, several challenges remain. These varieties have relatively low protein content of around 40%, and they have small seed sizes, which are quality-related drawbacks. Furthermore, they lack resistance to Pytophthora stem rot and soybean mosaic virus, both of which are common in Japan. To address these issues, predictions based on Smart Breeding techniques are being used to develop new varieties that combine high yield, superior quality, and multi-disease resistance. Moving forward, smart breeding methods will be incorporated to ensure that subsequent lines achieve a protein content of 43% or higher and yields of 3 t/ha or more.