Feasibility of Intraspecific Mix Cropping in Japan-Trials with Soybean Lines in Kawatabi Field Center

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Intraspecific mix cropping of multiple genotypes of a single crop has been a great concern. Mix cropping traditionally utilizes multiple crops (interspecific) and is conducted in developing countries. The interspecific mix cropping generally improves crop productivity by compensating resource use temporally and spatially. Its reductive effects on pests and diseases are also expected. However, different plant shapes and maturity limits mechanization. On the contrary, the intraspecific mix cropping may allow mechanization with maintaining the general mix cropping effects. Some studies have already reported the positive effect of intraspecific mix cropping but the practical application is quite limited. Under the situation, we conducted field experiments of soybean in Kawatabi Field Center, Graduate School of Agricultural Science, Tohoku University.

For the applicable mix cropping in modern agriculture, we established 3 concepts : same harvest time, similar seed size and similar nutrition contents. For the purpose, near isogenic lines were selected with different growth habits, indeterminate (IND) and determinate (DET), by considering mix cropping effects.

Five -year experiments indicated that mix cropping of 1 IND line and 1 DET line (alternative arrangement) had significant positive effects on leaf area and yield, but the enhancement of yield was not large. Mix cropping of 5 IND lines and 5 DET lines (mix seeding) had higher positive effects on yield than that of 1 IND line and 1 DET line, suggesting that the genotypic diversity is important in mix cropping. However, the positive effects on yield were unstable among years. The average increase of yield by mix cropping was only 5 %, being inadequate for the practical application. The enhancement of seed productivity or other advantages, such as pests and diseases, may be required. The IND lines tested in this study did not show superior growth and production compared to DET lines, being one of the restriction factors of low positive effects on yield. Further study on finding out suitable IND and DET lines and combinations is needed.