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The effect of growth habit on single seed weight and its uniformity in soybean

*Shin Kato**, Region of Japan, National Agriculture and Food Research Organization, Ontario, Canada
Takashi Sayama, Western Region Agricultural Research Center, National Agriculture and Food Research Organization, Tsukuba, Japan
Masao Ishimoto, Region of Japan, National Agriculture and Food Research Organization, Tsukuba, Japan
Takeshi Nishio, Department of Plant Breeding and Genetics, Tohoku University, Tohoku, Japan

In Japan, single seed weight (SSW) and its uniformity are important traits which affect the processing and appearance quality of soybean foods. The timing of formation of each flower and the seed filling duration in indeterminate growth habit (IND) varieties tends to vary more depending on the pod position compared to determinate growth habit (DET) ones. These timing and duration variations have been presumed to affect SSW and its uniformity, and therefore, IND varieties have not been used in Japan. In this study, stem growth habit near isogenic lines (NILs) were developed, and the effects of growth habit on SSW and its uniformity were evaluated.

An IND breeding line, “Y1312-2”, and three DET breeding lines with large seed weight, i.e., “Tohoku 160”, “Tohoku 162”, and “Tohoku 164”, were used as a donor parent and recurrent parents, respectively. Each NIL population, consisting of five IND and DET BC4F4 lines, were tested at two locations in two year with two replications. Three plants were randomly selected from each plot, and were harvested individually. SSW and coefficient of variance of SSW (SWCV) were measured by individually weighting the SSW of randomly selected 100 seeds, and by calculating the mean of 3 plants in each plot.

Four-way analysis of variance (ANOVA) by using factors, "Cross combination (C)", "Location (L)", "Year (Y)", and “Stem Growth habit (S)” showed that SSWs of IND were slightly greater than ones of DET, and that there were not significant differences in SWCV. On the other hand, there was a significant SxC interaction in SWCV. Additional ANOVA for each cross combination showed that the effect of IND on SWCV changes depended on genetic background, and the differences were smaller than the differences between cross combinations. These results indicated that IND introduction did not have an effect on SSW.