

Dry Matter Production and Nitrogen Utilization of High Yielding Soybean Cultivars

Yohei Kawasaki*, Yu Tanaka, Keisuke Katsura and Tatsuhiko Shiraiwa
(Graduate School of Agriculture, Kyoto University)

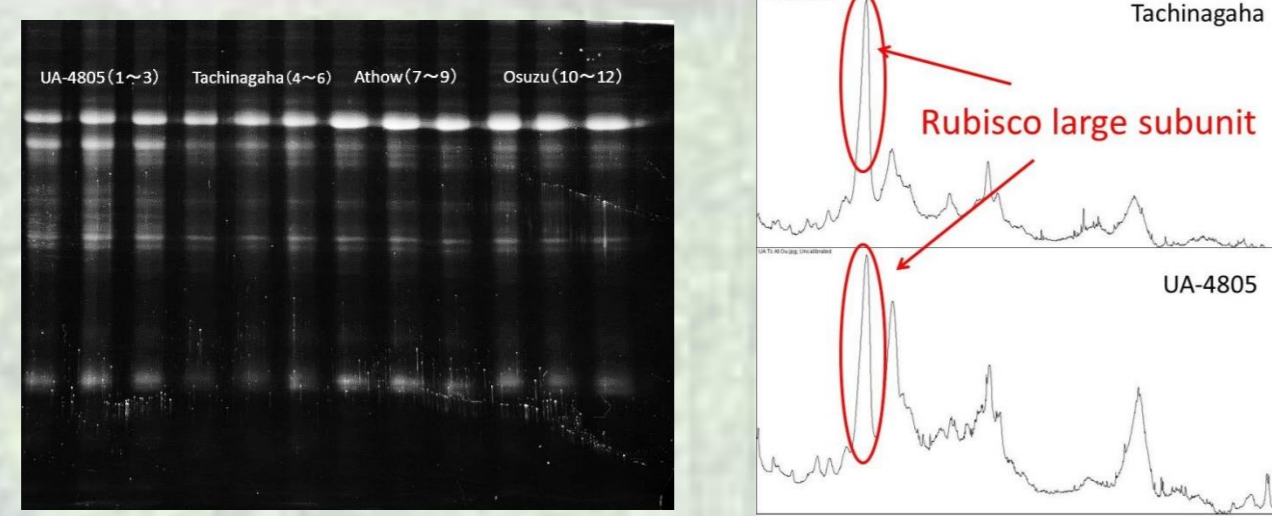
Soybean [*Glycine max* (L.) Merr.] is an important crop for oil and protein. The recent cultivars achieved high yield via greater dry production rather than greater harvest index. The objective of this study is to identify the most important trait related to higher dry matter production through comparing recent Japanese and US soybean cultivars.

Material and Methods

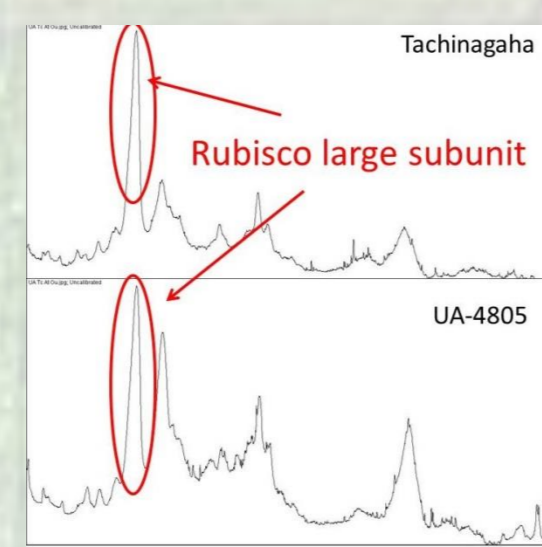
7 Japanese cultivars and 8 US cultivars were grown under optimum condition at Takatsuki experimental farm, Osaka, Japan (34.5°N) in 2012 and 2013. Sowing date were June 28th and July 2nd. Dry weight of each cultivars were measured at R5, R5+30days and R8 with three replications. During R5 to R8, abscised leaves and petioles were collected and dry weight were measured. Leaf nitrogen content of R5 and R5+30d samples were measured through Kjeldahl method. Leaf Rubisco content were quantified by CBB staining after SDS-PAGE (Makino *et al.* 1986). Image J was used for gel analysis.



Black net was settled between ridges to collect abscised leaves and petiole.



Stained gel after SDS-PAGE (Left). The content of Rubisco large subunit was quantified through Image J comparing with standard BSA. (right)



Results

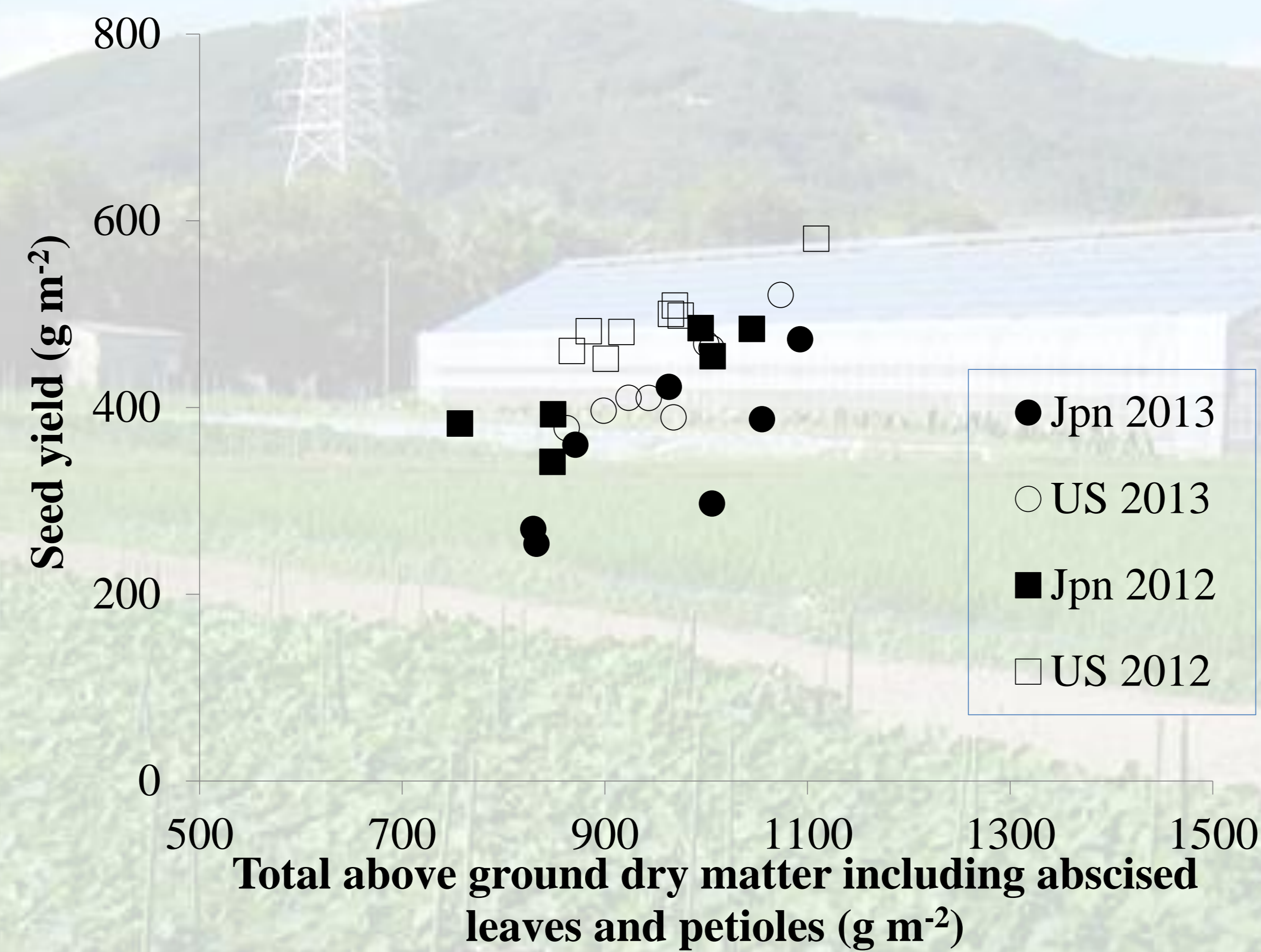


Fig.1. Seed yield correlated with total above ground dryweight which including abscised leaves. ($R = 0.594^{**}$)

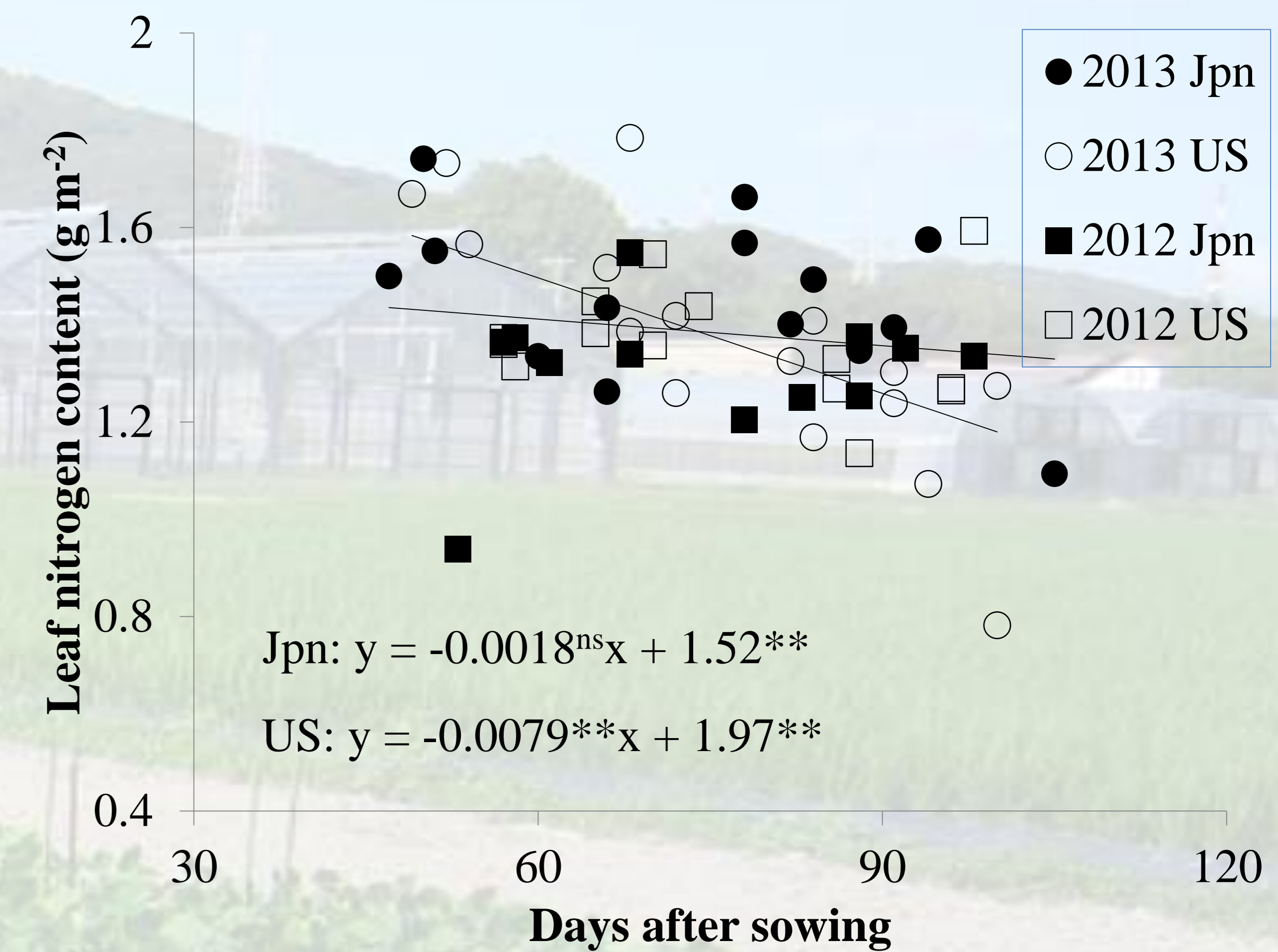


Fig.2 Leaf nitrogen content of US cultivars decreased gradually. On the other hand, Japanese cultivars showed no trend.

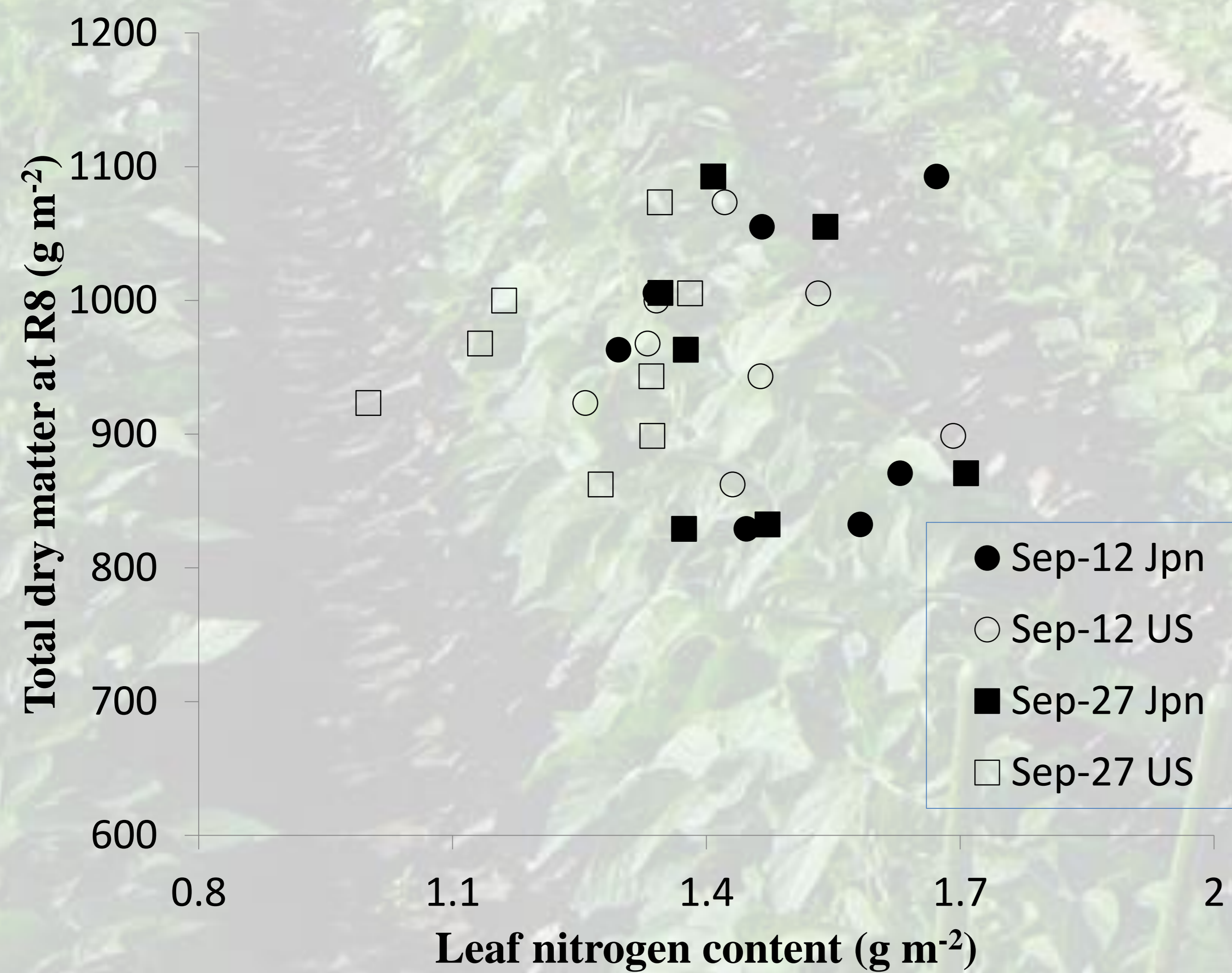


Fig.3. Relationship between total dry matter at R8 and leaf nitrogen content at Sep-12 and Sep-27 in 2013. Correlation was not significant.

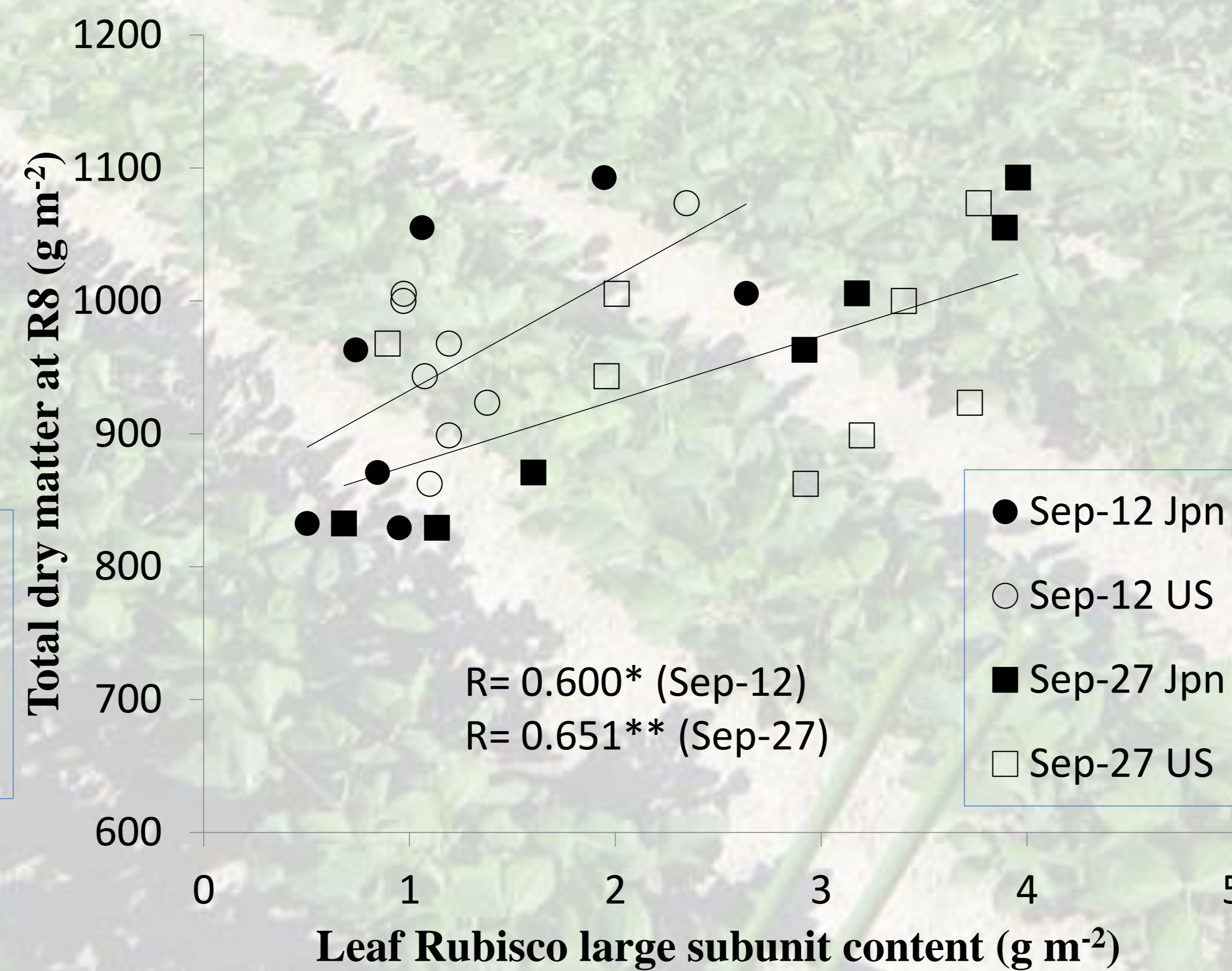


Fig.4. Relationship between total dry matter at R8 and Leaf Rubisco large Subunit content at Sep-12 and Sep-27 in 2013. Significant correlation was found in both days.

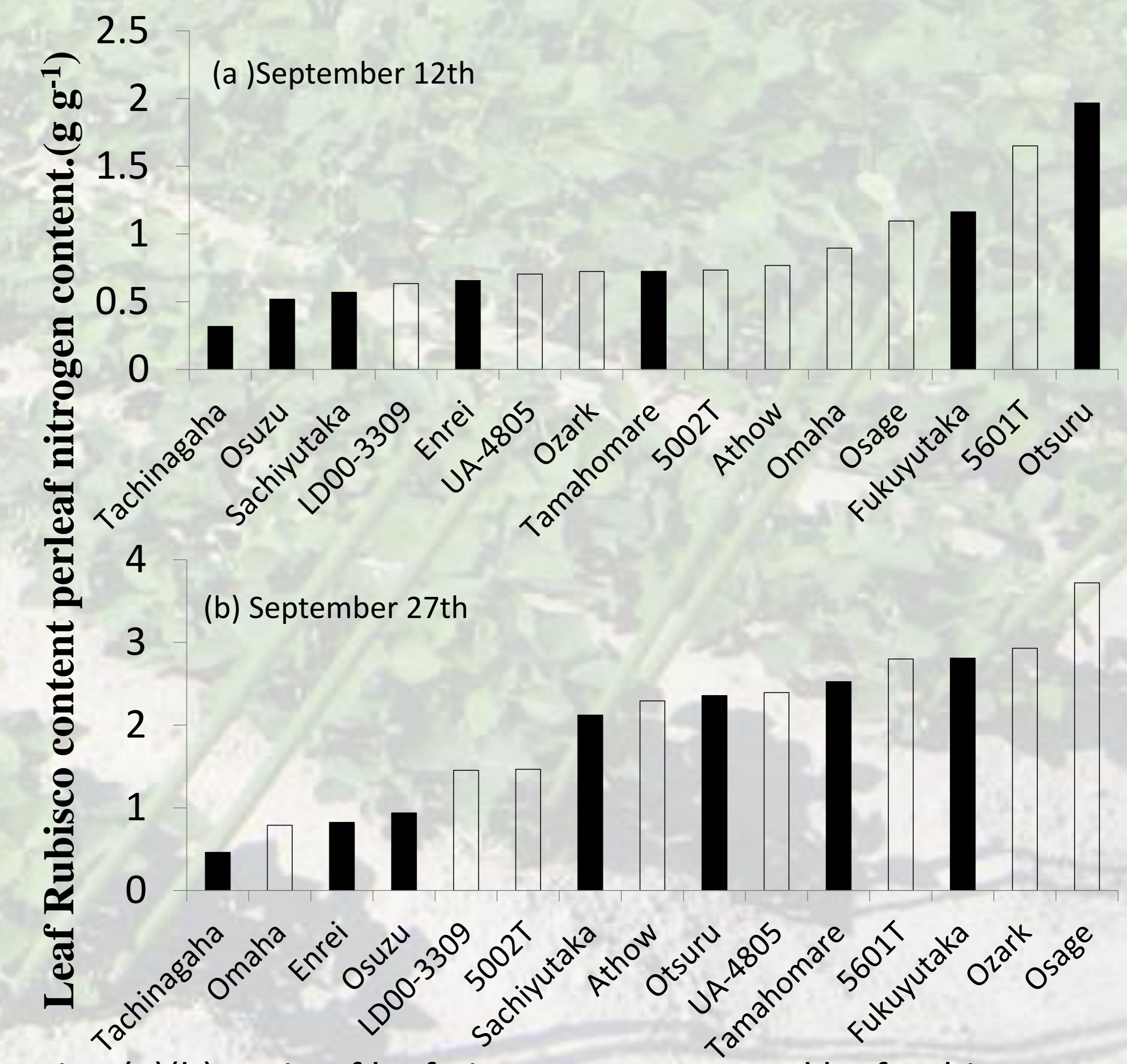


Fig.5(a)(b) Ratio of leaf nitrogen content and leaf Rubisco content. Large diversity was found among cultivars.

Conclusion

Seed yield was correlated with total above ground dry matter including abscised leaves and petioles among both Japanese and US soybean cultivars. Although additional measurement of leaf traits related to photosynthesis is needed, leaf Rubisco content, rather than leaf nitrogen content, can be a good indicator for selecting high potential biomass productivity during seed filling.