PB74

Influence of Water Deficit on Leaf Cuticular Waxes of Soybean

Mokpo National University : Kwan-Su Kim*, Si-Hyung Park
Jeonnam Agricultural Research and Extension Services : Dong-Kwan Kim
Purdue University : Matthew A. Jenks

Objectives

Leaf cuticular waxes cover essentially all aerial plant surfaces and form an important protective barrier between a plant and its environment. These cuticular waxes play an important role in plant resistance to a variety of biotic and abiotic stresses such as those caused by fungal pathogens, phytophagous insects, freezing temperatures, and drought. This study examines varietal differences in leaf cuticular wax amount and chemical composition on eighteen soybean (*Glycine max* (L.) Merr.) cultivars, and the effect of drought on wax deposition on leaf surfaces.

Materials and Methods

○ Eighteen cultivars of soybean were used in this study, and included 'Anpyeong' (AP), 'Geomjeong1' (B1), 'Geomjeong3' (B3), 'Geomjeong4' (B4), 'Boseok' (BS), 'Dachae' (DC), 'Dagi' (DG), 'Doraemi' (DRM), 'Dawon' (DW), 'Eunha' (EH), 'Heukcheong' (HC), 'Pungsan' (PS), 'Saebyeol' (SB), 'Soho' (SH), 'Seonheuk' (SHK), 'Sojin' (SJ), 'Sorok' (SR) and 'Sowon' (SW). Soybean seeds were sown in pots during the normal growing seasons beginning on June 15, 2004, and grown under a plastic rain shelter in the field.

○ Water-deficit was imposed on eighteen soybean cultivars by withholding irrigation for 10 days (2nd times for 5 days in August) during the post-flowering stage, and the effect on seed yield and leaf waxes compared with a well-watered control. Wax constituents were analyzed using GC and traits related to seed yield were measured at harvesting time.

Results and Discussion

○ Leaf cuticular waxes of soybean were dominated by alkanes and triterpenoids, with aldehydes being the next most abundant class. In all cultivars, the major alkane constituents were the C27, C29, C31, and C33 homologue, whereas the major aldehydes were the C30 and C32 homologue. Triterpenoids were 3-keto-olean-3-ene, lupenone, lupeol, α-, and β-amyrin. Drought treatment caused a 31% increase in the total wax amount, with a 59% increase in total alkanes, a 16% increase in triterpenoids, and a 28% increase in the total of unknowns, and drought exposure had only minor effects on the chain length distribution within each wax class.

○ Drought treatments caused a large decrease in seed yield, but did not affect the mean weight of individual seeds. Seed yield was inversely correlated with the amount of alkanes, triterpenoids, and total waxes (-0.329*), indicating that drought induction of leaf wax deposition does not contribute directly to seed set.

Corresponding author : Kwan-Su Kim E-mail: kskim@mokpo.ac.kr Tel : 061-450-2661

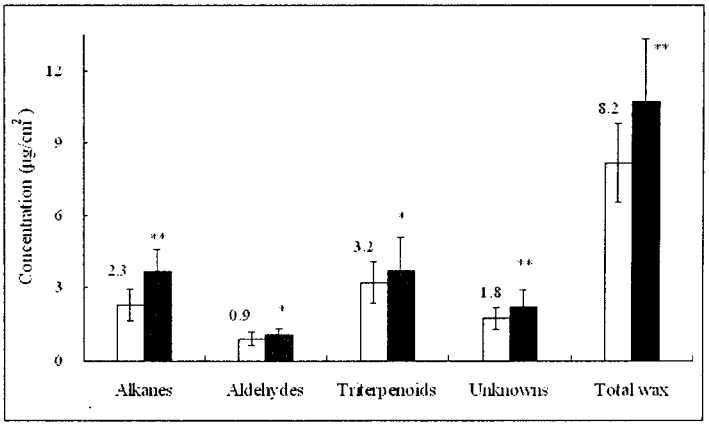

Fig. 1. Alkane, aldehyde, triterpenoids, unknowns, and total leaf cuticular wax amounts for control (□) and drought-treated plants (■) expressed as a mean of all 18 soybean cultivars. Total wax is the sum of alkanes, aldehydes, triterpenoids, and unknown constituents.

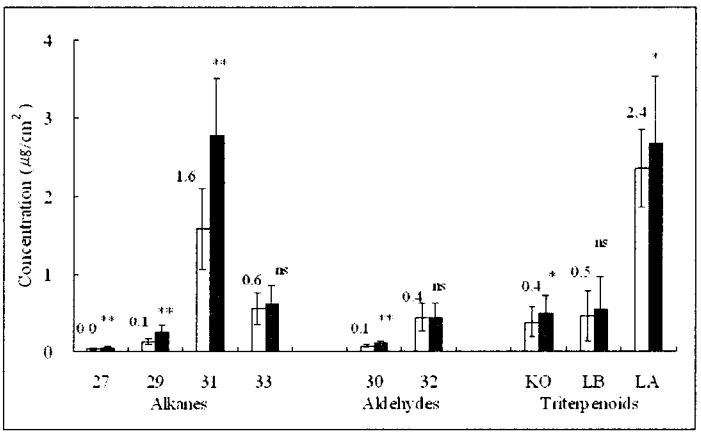

Fig. 2. Individual leaf wax constituents for the alkanes, aldehydes, and triterpenoids in control (□) and drought-treated plants (■) expressed as a mean of all 18 soybean cultivars. KO, 3-keto-olean-12-ene; LB, total of lupenone and β-amyrin; LA, total of lepeol and α-amyrin.

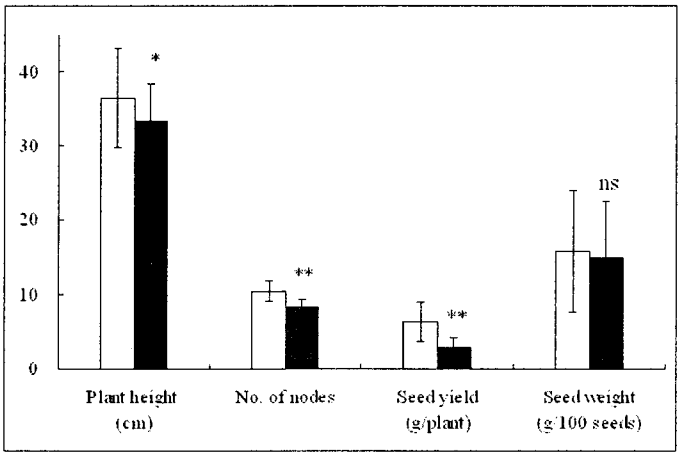

Fig. 3. Plant height, Number of nodes, seed yield, and seed weight for control (□) and drought-treated plants (■) expressed as a mean of all 18 soybean cultivars.