F-102

Temperature is the key climate factor controlling soybean compositions

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From 2010 to 2013, 763 soybean samples were collected from an extensive area of China. The correlations between seed compositions of the samples and climate data were analyzed. The results showed that temperature was the key climate factor controlling soybean compositions. The contents of crude protein and water-soluble protein, total amount of protein plus oil, and most of the amino acids were positively correlated with an accumulated temperature above or equal to 15 ℃ (AT15) and the mean daily temperature (MDT) but were negatively correlated with hours of sunshine (HS) and diurnal temperature range (DTR). The correlations of crude oil, total isoflavones, total oligosaccharides, total phospholipids and most fatty acids with climate factors were opposite to those of crude protein. Crude oil content had a quadratic regression relationship with MDT, and a positive correlation between oil content and MDT was found when the daily temperature was below 19.7 ℃. A path analysis indicated that DTR was the main factor that directly affected soybean protein and oil contents, while total isoflavones, oligosaccharides, phospholipids were directly affected by multiple climate factors. The study illustrated the effects of climate factors on soybean compositions and proposed agronomic practices for improving soybean quality in different regions of China. The results provide a foundation for the regionalization of high-quality soybean production in China and similar regions in the world.