Comparison of Soybean Variety Trial Systems and Procedures in the USA and China

Lingxiao Zhang, Delta Research and Extension Center, 82 Stoneville Road, Stoneville, Mississippi State University, Mississippi State, MS 38776, USA; Yingzhi Chen, National Agro-Tech Extension & Service Center Ministry of Agriculture No. 11 Nongzhanguan Nanli Beijing 100026, China; Cunxiang Wu and Tianfu Han, Institute of Crop Sciences, Chinese Academy of Agricultural Sciences, No. 12 Zhongguangcun South Street, Beijing 100081, China

Corresponding author: Lingxiao Zhang. LZhang@drec.msstate.edu


The United States is the biggest soybean producing country in the world, constituting one third of total global soybean production (16). China is the oldest soybean production country (10,12) and still has the fourth largest soybean production capacity behind the United States, Brazil, and Argentina (16). The contribution of Chinese soybean genetic resources to the world soybean germplasm collection and variety development is very significant and of great importance (14). In the last quarter century, the unit soybean yield has increased steadily with an average rate of approximately 32 to 36 kg/ha (~0.45 to 0.5 bu/acre) per year in China and the United States (16). This increase is largely due to the use of newer soybean varieties with improved yield potential and other characteristics such as better resistance to diseases, insects, and other environmental stresses. Most of these new varieties have been released through soybean variety trials. Thus, soybean variety trials played a critical role in this yield improvement. Due to historical reasons and current soybean production realities, variety trial systems in the United States and China are very different. This paper is intended to introduce, explain, and compare the systems of soybean variety trials in the United States and China so that soybean researchers and other interested parties can understand the role of the soybean variety development procedures in these two countries. This will help soybean scientists, including breeders, to understand both production and variety trial systems and communicate effectively with each other.

The Soybean Variety Trial System and Procedures in the USA

Maturity group and its adaptation zone. To understand the variety trial system in the United States, it is important to know the concept of soybean maturity group (MG), which is a common term used in soybean production in the United States as well as in other major soybean production regions in the world (2). However, this concept is not commonly used in China (20). In the United States, soybean varieties are categorized based on their maturity time (5), by which a group of varieties that have similar length of physiological maturity time (when planted at the same time) are categorized into the same MG.

Although the concept of MG has long been recognized and adopted, the scientific definition of this concept has never been precisely described anywhere due to the fact that this concept was developed through time. The MG value of a new variety is obtained by referencing or comparing it with that of an old variety with a known MG value. The environmental conditions are different in each year. The same soybean variety may not mature at the same date as it did for the previous year even if it was planted at the same date. Therefore, it is difficult or almost impossible to quantify the MG value for a new variety only based on location and planting date with one- or two-year data alone.