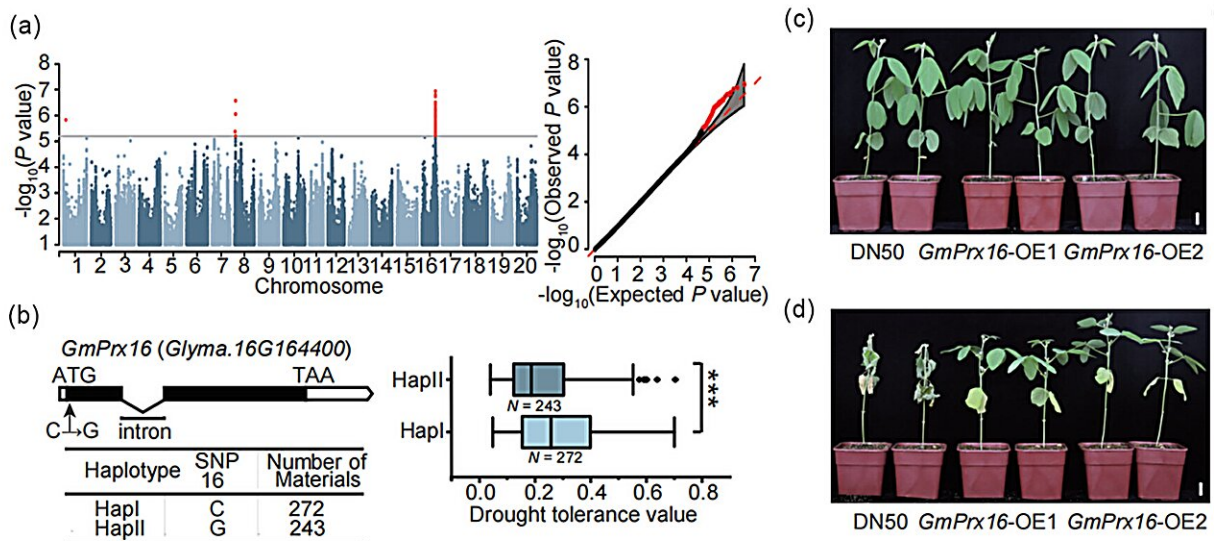


Peroxidase gene found to confer drought tolerance in soybean

November 30 2023, by Zhang Nannan



GmPrx16 conferred drought tolerance in soybean. Credit: IGDB

Over the past 100 years, global water use has increased sixfold, and increased drought has led to substantial declines in crop production in recent decades. Soybean [*Glycine max* (L.) Merr.], originally domesticated in China about 5,000 years ago and subsequently spread worldwide, has become an important and primary source of vegetable oil and protein, as well as a supplement in livestock feed.

However, [soybean](#) is one of the most [drought](#)-sensitive crops, and drought can significantly reduce its yield and quality. Therefore, breeding high-yielding, drought-tolerant soybeans is critical to meeting the growing demand for soybean production and addressing the worsening water deficit.

A research team led by Prof. Tian Zhixi of the Institute of Genetics and Developmental Biology (IGDB) of the Chinese Academy of Sciences, in collaboration with Prof. Ma Junkui from the Industrial Crop Institute of Shanxi Agriculture University/Shanxi Academy of Agricultural Sciences, identified the [drought tolerance](#) value of 585 soybean accessions covering the major growing areas of the world to mine the genes and corresponding beneficial alleles in soybean germplasm.

The paper entitled "Natural allelic diversities of GmPrx16 confer drought tolerance in soybean" was published in *Plant Biotechnology Journal* on Nov. 22.

A significant locus on chromosomes 16 was detected by genome-wide association study (GWAS). Further analysis showed that a [peroxidase](#) harboring a nonsynonymous SNP was the occasional gene in the locus, and the nonsynonymous mutations resulted in peroxidase activity differences between the two GmPrx16 haplotypes.

Furthermore, overexpression of GmPrx16 in Dongnong No.50 could improve the peroxidase activity and enhance the drought tolerance in soybean, but GmPrx16 RNAi transgenic lines reduced the peroxidase activity and showed a drought-sensitive phenotype.

Interestingly, overexpression of GmPrx16 could improve salt tolerance in soybean at the same time, suggesting multiple applications of GmPrx16 in breeding abiotic tolerant soybean.

GmDRF1 and GmDRF2 could bind to the promoter of GmPrx16 and regulate the expression level of GmPrx16, proposing the working model of GmPrx16: drought stress induces the expression of GmDRF1 and GmDRF2, GmDRF1 and GmDRF2 physically interact with the promoter of GmPrx16, and promote its expression, thereby influencing the accumulation of ROS and regulating drought tolerance in soybean.

More information: Zhifang Zhang et al, Natural allelic diversities of GmPrx16 confer drought tolerance in soybean, *Plant Biotechnology Journal* (2023). DOI: [10.1111/pbi.14249](https://doi.org/10.1111/pbi.14249)

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