Research confirms exogenous methyl jasmonate can enhance tomato resistance

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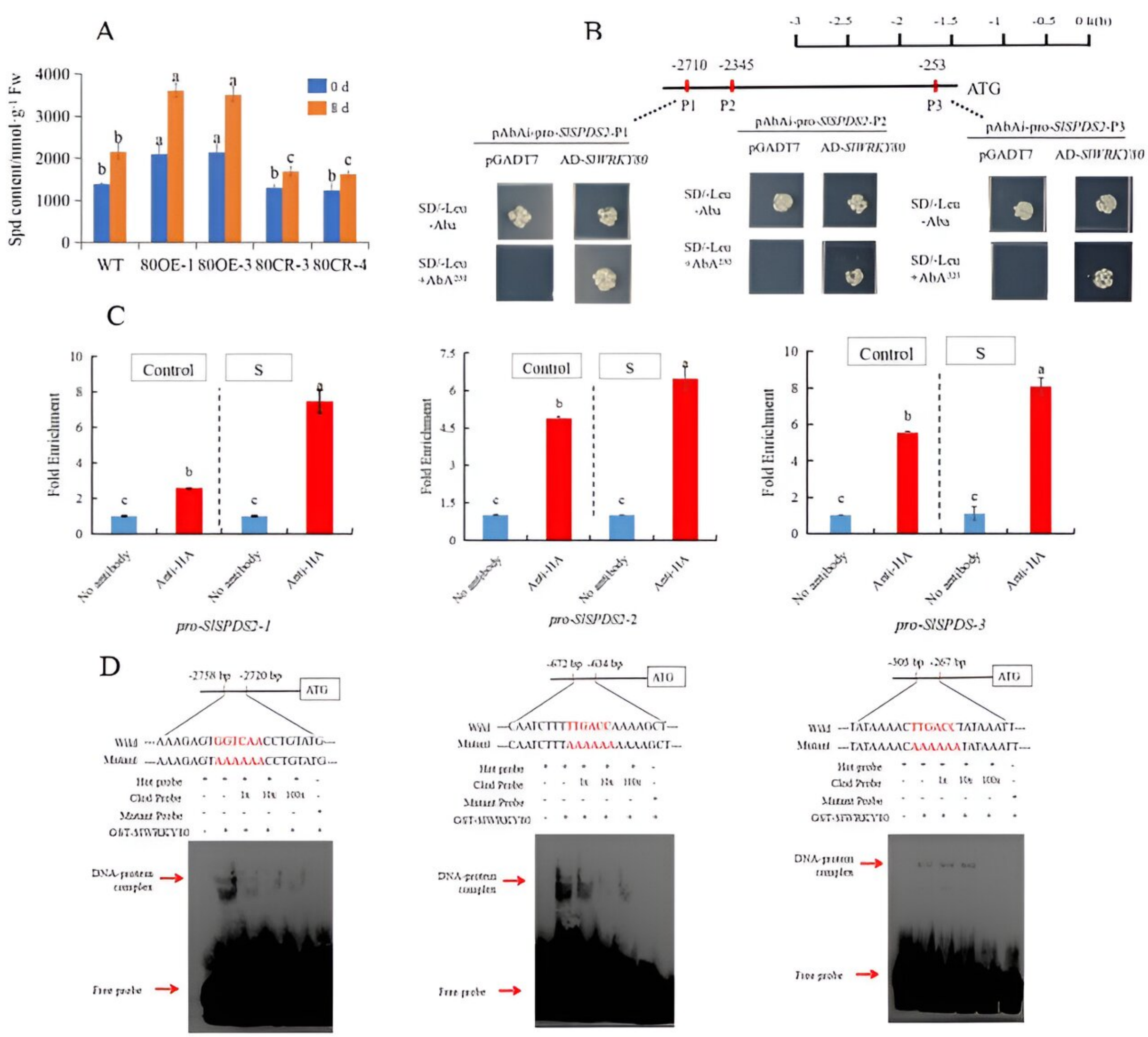


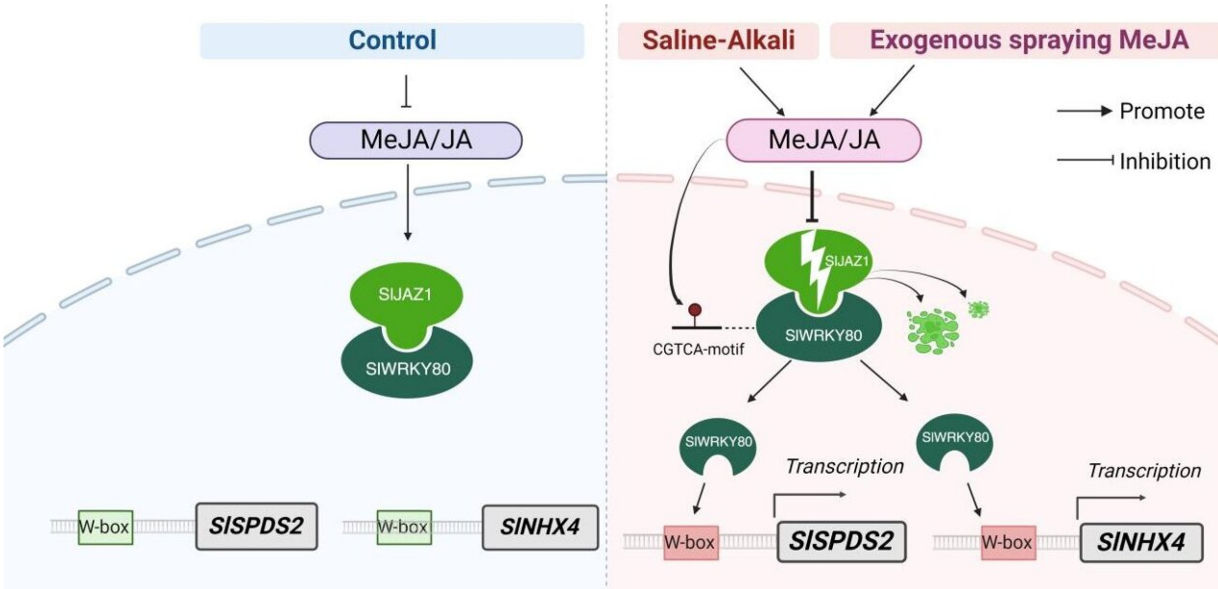
Binding of SlWRKY80 to the promoter region of *SlSPDS2* and promotion of Spd synthesis. Credit: *Horticulture Research*

Tomato (Solanum lycopersicum L.) is the most widely cultivated and consumed horticultural crop. At present, saline-alkali is an important abiotic stress source that affects tomato production. Exogenous methyl jasmonate (MeJA) can enhance the resistance of tomatoes to various stresses, but its exact mechanism is still unclear.

Horticulture Research has now published new research titled "SlWRKY80-mediated jasmonic acid pathway positively regulates tomato resistance to saline-alkali stress by enhancing spermidine content and stabilizing Na^+/K^+ homeostasis."

In this study, researchers confirmed that 22.5 μmol/l MeJA could significantly improve the saline-alkali stress resistance of tomatoes. Saline-alkali stress increased the endogenous MeJA and jasmonic acid (JA) contents. Exogenous application of 22.5 μmol/l MeJA increased the endogenous MeJA and JA contents in tomato.

Furthermore, an important transcription factor, SlWRKY80, responded to MeJA and actively regulated tomato resistance to saline-alkali stress. Spraying of exogenous MeJA (22.5 μmol/l) reduced the sensitivity of SlWRKY80 knockout lines to saline-alkali stress.



A working model for the saline-alkali reaction mediated by SlWRKY80 through the JA pathway and the regulation of *SlSPDS2* and *SlNHX4* in tomato. Credit: *Horticulture Research*

The SlWRKY80 protein directly combines with the promoter of SlSPDS2 and SlNHX4 to positively regulate the transcription of SlSPDS2 and SlNHX4, thereby promoting the synthesis of spermidine and Na^+/K^+ homeostasis, actively regulating saline-alkali stress. The augmentation of JA content led to a notable reduction of 70.6% in the expression of SlJAZ1 and the release of the SlWRKY80 protein interacting with SlJAZ1.

In conclusion, exogenous MeJA in tomato stress resistance through multiple metabolic pathways elucidated that exogenous MeJA further promotes spermidine synthesis and Na^+/K^+ homeostasis by activating the expression of SlWRKY80, which provides a new theoretical basis for the study of the JA stress resistance mechanism and the actual production of tomato.

More information: Chunyu Shang et al, SlWRKY80-mediated JA pathway positively regulates tomato resistance to saline-alkali stress by enhancing spermidine content and stabilizing Na+/K+ homeostasis, *Horticulture Research* (2024). DOI: 10.1093/hr/uhae028

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