Plants cannot select, or leave, their living environment, so have developed a unique mechanism to read environmental signals and respond by adjusting their cell activities for increased chances of survival and reproduction. At the Key Laboratory of Cell Activities and Stress Adaptations of the Ministry of Education of Lanzhou University School of Life Sciences, researchers have been investigating these plant signalling mechanisms for more than a decade.

Studying genes involved in regulating a plant’s response to key growth hormones is among the ways the key laboratory has contributed to a better understanding of the natural world. A team led by Li Jia, dean of the School of Life Sciences, studied the expression patterns of hundreds of receptor kinase genes in Arabidopsis thaliana, a small flowering plant often used in laboratories. They demonstrated that the receptor kinase BAK1 is crucial in regulating a particular receptor kinase that detects the plant hormone brassinosteroids, which regulate physiological processes. They discovered mutation, deletion or overexpression of BAK1 and its paralogs in Arabidopsis thaliana had a huge impact on its growth and biotic responses. The work on the identification of BAK1, published in Cell, was one of the first detailed studies to profile the impact of BAK1’s role in the brassinosteroid pathway.

More recently, Li’s team revealed the perception mechanism of RGF1, a peptide hormone in root meristem development. The meristem region is the frontline of plant growth and self-renewal. However, it was a mystery how the cells received RGF1 signals that led to meristem growth. Li’s team discovered a subfamily of receptor kinases they named RGI1 to RGI5 that can sense RGF1. RGI1 in particular was a predominant receptor of RGF1, with direct impact on the meristem region at the plant root. Interestingly, BAK1 possibly also regulates the function of RGI1. Genetically modified Arabidopsis thaliana with multiple deletions of the RGI family revealed significantly stunted root growth.

At a glance

- The School of Life Sciences was founded in 1946.
- It houses the State Key Laboratory of Grassland and Agro-Ecosystems (SKLGAE), the Ministry of Education Key Laboratory of Cell Activities and Stress Adaptations, and the Ministry of Education Research Centre of Agriculture in Arid Regions and Ecological Remediation.
- It has more than 150 faculty members and 1,500 students.
- Researchers at the school have authored more than 200 high-impact papers.