# Plant hormone increases cotton yields in drought conditions

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A naturally occurring class of plant hormones called cytokinins has been found to help increase cotton yields during drought conditions, according to Agricultural Research Service (ARS) scientists.

Cytokinins promote cell division and growth in plants. In cotton, cytokinins stimulate the growth of the main plant stem and branches. Commercially produced cytokinins are routinely applied in apple and pistachio orchards to promote fruit growth.

John Burke, director of the ARS Cropping Systems Research Laboratory in Lubbock, Texas, found that applying cytokinins to cotton crops can increase yields in water-limited environments with reduced irrigation or no irrigation. Burke was granted a patent for his discovery.

Half of the U.S.-produced cotton is grown in the arid high plains of Texas. In addition to a short growing season, 60 to 65 percent of the acreage in the area is dry land and relies on rainfall for soil moisture. Young cotton seedlings have small root systems, making it difficult for them to reach available soil water. Cytokinins trick the young plant's water stress defenses, prompting the plant to quickly build a bigger root system to access deep soil moisture. They also stimulate the growth of a protective wax on the surface of the plant that helps reduce water loss.

Tests conducted by Burke found one application of cytokinins produced a 5 to 10 percent increase in yields under water-reduced conditions. Additionally, tests determined that cytokinins didn't help or hinder yields

under fully irrigated or rainy conditions, making it safe for use in all weather environments. There is also no extra work involved for the grower because cytokinins can be applied when conducting normal weed-management practices early in the season.

To be effective, the cytokinins should be applied at a relatively low concentration to cotton seeds or to cotton plants at an early stage of development. ARS is working closely with commercial companies to make this material available to cotton growers in the future.

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