Tapping into sorghum's weed-fighting capabilities to give growers more options

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By unlocking the genetic secrets of sorghum, Agricultural Research Service (ARS) scientists have found a way to make one of the world's most important cereal crops a better option for growers. Researchers at the ARS Natural Products Utilization Unit in Oxford, Miss. also may have opened a door to reducing pesticide use in the production of other crops.

Sorghum secretes a compound known as sorgoleone that is instrumental in helping the plant combat weeds. But in a way it does its job too well. Certain crops don't grow well in fields where sorghum has been raised, causing problems for growers who want to plant different crops on those fields.

The research team at Oxford included molecular biologist Scott Baerson, chemist Agnes Rimando, research leader Stephen O. Duke, plant physiologist Franck E. Dayan, molecular biologist Zhiqiang Pan, and plant physiologist Daniel Cook, who now works at the ARS Poisonous Plant Research Laboratory in Logan, Utah.

The team started with two pieces of evidence that helped them address the problem. Previous studies showed that sorgoleone is produced in the plant root hairs, and that a special type of enzyme within the plant plays a major role in sorgoleone production.

Using a strategy called sequence tagging, the scientists searched an established sorghum genome database for gene sequences associated

with that class of enzymes. They found two gene sequences expressed in the plant root hair cells that produced the enzymes. When they silenced the two gene sequences, it dramatically reduced sorgoleone levels in the sorghum plants produced.

The results, published in *The Plant Cell*, could lead to sorghum lines without the soil toxicity problem, as well as lines with higher levels of sorgoleone that offer superior weed-fighting capabilities without posing environmental hazards.

This discovery will enable researchers to look for similar gene sequences in other crops to increase their natural pest-fighting capabilities and reduce the need for pesticides. Baerson and his colleagues have already identified similar sequences in rice that are involved in production of defense-related enzymes.

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