
INCREDIBLE FEATS OF
PLANT
BREEDING
PBCC
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AUG
2022
PEANUT BREEDERS DELIVER A KO TO THE NOTORIOUS RKN!*
*ROOT KNOT NEMATODE
Natural genetic resistance to historic pest found in a wild plant relative of modern cultivated peanut!
SEE INSIDE FOR DETAILS!

THE PROBLEM

The ravenous **root knot nematode (RKN)**, a microscopic worm with a big appetite for many of our crops, has threatened peanut production globally since the mid 20th century, with annual losses in the US alone reaching $80 million by the late 1980s. For decades, scientists researched ways to control the soil-borne pest, including crop rotation, chemical controls, and genetic resistance through plant breeding. The only success realized was with chemical controls, often in the form of broad-spectrum nematicides that sparked both environmental and human health concerns. In terms of breeding, only marginal levels of resistance could be achieved in cultivated varieites. At the time, the wild ancestors of modern peanut (that is, peanut's **crop wild relatives**) were basically unknown and appeared nearly impossible to use as sources of needed resistance. These wild relatives only had 20 chromosomes, compared to the 40 in cultivated peanut. Crossing looked difficult, if not impossible, so research involving peanut's wild relatives was essentially abandoned.

THE SCIENCE

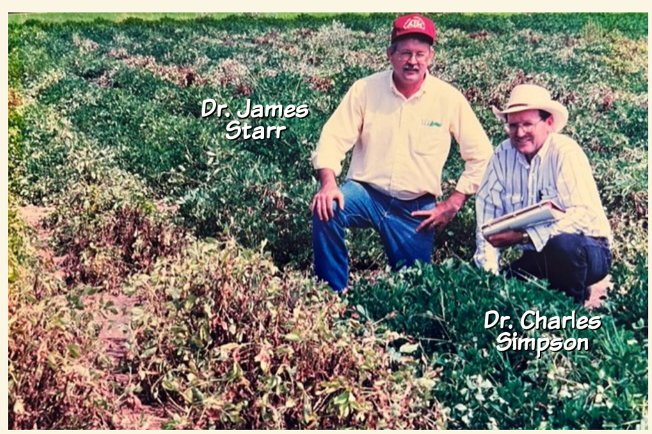
In 1987, plant breeders at Texas A&M discovered **RKN resistance** in several wild peanut species using a screening technique they developed. By coincidence, two of these resistant species had been used in another project where the breeders had developed a method for crossing with (and thus transferring wild genes into) modern, cultivated peanut. In testing their research materials for RKN resistance, they found they already had one resistant line in hand that was completely cross compatible with a widely grown and high yielding peanut variety! Additional work revealed that the resistance was the result of a single dominant gene, a breeder's dream. They immediately initiated what is known as a **backcrossing** program, rapidly cycling through three generations a year, and were able to release the first RKN resistant peanut cultivar in 2001, after 13 years of work. Today, thanks to **molecular breeding**, this task of updating an important variety with a needed resistance gene through backcrossing can now be accomplished in roughly half that time.

THE IMPACT

- RKN-resistant peanut cultivars have been a game-changer for peanut growers and consumers alike. As an example, one grower who contracted to grow seed of a new resistant variety noticed that the RKN-resistant plants in his seed field appeared healthier than the non-resistant plants in the adjacent, supposedly RKN-free, production fields. Sampling revealed a low-level population of RKN which had been stealing 10-12% of his yields **for years**, despite strategic crop rotations.
- Even bigger picture, this work proved that wild relatives of peanut carry genes of relevance to modern agriculture. From cereals to fruits, vegetables to oil seeds, **crop wild relatives** are increasingly appreciated as rich evolutionary reservoirs of useful genes that can help tolerate environmental stresses, resist pests and diseases, and increase quality. The conservation of wild plant biodiversity is critical to the future of our food system.

THE TEAM

TEXAS A&M UNIVERSITY



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