AGRONOMY JOURNAL

Closing Wheel and Downforce for No-Till Corn

No-till production systems present challenges for producers. High residue on the soil surface can interact with the planter, which can cause sub-optimal seed placement and furrow closure, negatively impacting emergence.

New research in *Agronomy Journal* investigated planter systems to improve corn emergence in no-till production systems. Researchers assessed a hydraulic row-unit downforce system, in-furrow variable-rate starter fertilizer system, and aftermarket closing wheels at multiple locations over multiple years in Wisconsin. Treatments included high and low downforce, starter fertilizer versus none, and three different aftermarket closing wheels.

Results from this work showed that the row-unit downforce effected corn emergence. The high soil moisture conditions during planting required lower downforce for proper seed placement and seeding depth. Aftermarket closing wheels maintained corn emergence regardless of the downforce setting.

Planting is a critical operation in crop production. Understanding the implications of planter setup and aftermarket components will help both researchers and producers in making equipment-purchasing decisions for optimizing the planting operation.

Research planter equipped with hydraulic row-unit downforce, various closing-wheel systems, and variable-rate starter fertilizer. Utilizing these technologies, planting corn in no-till production systems can help with emergence depending on soil conditions. Photo by Brian Luck.

Adapted from Drewry, J.L., Arriaga, F.J., & Luck, B.D. (2021). Closing wheel type and row unit downforce can affect corn germination in no-tillage production systems. *Agronomy Journal*. https://doi.org/10.1002/agj2.20774

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THE PLANT GENOME

Tracing the Evolution and Domestication of Citrus Fruits

The ancestral citrus inhabited the foothills of the Himalayas during the late Miocene global cooling about eight million years ago—then, it immediately diversified into a rapid radiation. How the current enormous citrus diversity was achieved is a question that remains unanswered. In contrast to the appealing, seedless, and tasteful fruit of edible citrus, wild pure citrus mandarins, for instance, bear inedible, small, distasteful, acidic, and seedy fruit.

A series of two articles in *The Plant Genome* provide original insights on these questions. The researchers performed comparative genomic analyses on wild and domesticated citrus, showing that the abundance of pectins, terpenoids, and flavonoids characterizing citrus fruit were the result of large expansions of pivotal gene families. Interestingly, domestication removed genes involved in the biogenesis of distasteful compounds and affected genes associated with the regulation of citric acid, increasing palatability. Other key genes were highly conserved in stretches of pure mandarin regions, such as the apomictic reproduction gene that allowed huge dispersion of the edible genotypes.

These results support the idea that some genes that naturally evolved in citrus later became potential targets of domestication and that the pervasive adaptive evolution that citrus shows may be in part responsible for the phenotypic differences observed among current species.

Researchers scrutinizing fruits of pummelo (left) and mandarin (right), two extant species derived from parental, ancestral wild species that through successive hybridization and introgression gave rise to all palatable current citrus. Photos by Ángel García.

Adapted from Gonzalez-Ibeas, D., Ibanez, V., Perez-Roman, E., Borredá, C., Terol, J., & Talon, M. (2021). Shaping the biology of citrus: I. Genomic determinants of evolution. *The Plant Genome*. https://doi.org/10.1002/tpg2.20104 and Gonzalez-Ibeas, D., Ibanez, V., Perez-Roman, E., Borredá, C., Terol, J., & Talon, M. (2021). Shaping the biology of citrus: II. Genomic determinants of domestication. (2021). *The Plant Genome*. https://doi.org/10.1002/tpg2.20133

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