

New Electronics Guide

Seeds to Water

A moisture-sensing planter helps ensure that seeds get the water they need for a healthy start.

“In most cases, the amount of water in the soil varies as you move throughout a field,” says ARS agricultural engineer Lyle M. Carter, who is at Shafter, California.

Growers who set a planting depth based on the driest site in a field, notes Carter, may inadvertently give only 10 percent of the seeds the ideal moisture for germination.

In soggy soils, seeds rot. In too-dry soils, seeds may sprout—only to shrivel and die. These losses force growers to replant or to hassle with irregular stands. Either outcome drives up production costs and decreases yields.

ARS is seeking a patent for Carter’s invention, which is an accessory that attaches to a tractor-mounted tool such as a planter. With power from the tractor’s battery, the apparatus sets up and measures a current that flows between two sturdy electrodes.

The first electrode compacts a half-inch-wide ribbon of soil, through which the current travels. The second electrode, a knife-shaped probe, trails behind the first, to cut open the ribbon once the current is measured. The stronger the current, the greater the amount of water that’s available to thirsty seeds.

The amount of current that moves through the ribbon—known as

electrical conductivity—is influenced not only by the amount of water, but also by other factors such as type of soil and saltiness. The device minimizes the effects of the other factors, giving a more accurate reading.

What if the electrodes detect too low a current? The sensors and the scraper blade that pushes soil out of the way are hydraulically lowered as the system hunts for the correct current (Carter set his prototype at 10

so the field will remain even enough to cultivate and irrigate.

Though the amount of soil that’s shoved aside by the scraper blade may vary, seed depth doesn’t change. Once the blade exposes the appropriate surface, seeds are always planted at the depth chosen by the grower. “If you set the device to plant every seed one-and-three-fourths inches deep,” explains Carter, “it will do that for you consistently.”

Keeping seed depth uniform is as important as giving seeds the right amount of moisture. If planted too deep, for example, sprouts might run out of energy before they reach sunlight.

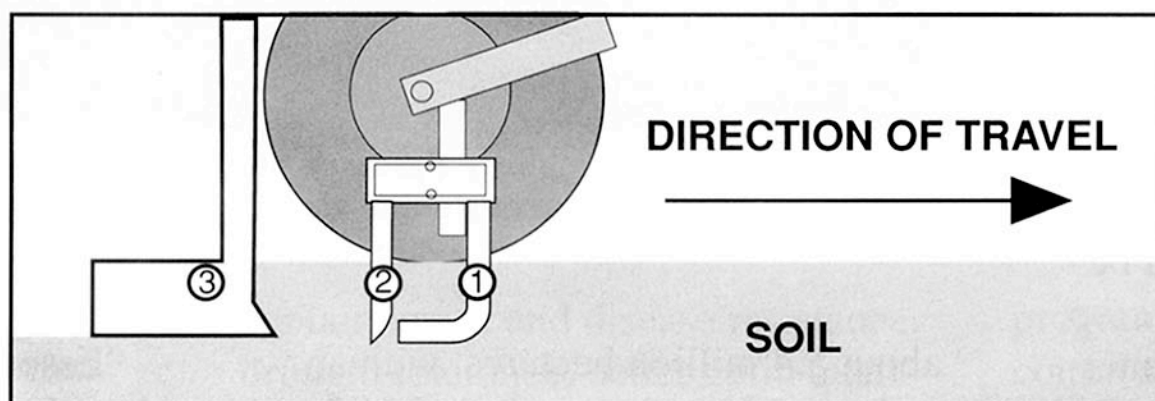
Carter designed the device for growers who plant into raised seedbeds or ridges already moistened by rain or a pre-plant irrigation. In the Midwest and South, this practice of ridge farming is typical for soybeans, corn, peas, or other large-seed crops.

Known as bed-planting in the Far West, it is common there for growing cotton. Carter tested a prototype of his invention in cottonfields near his laboratory.—By **Marcia Wood, ARS.**

For more informa-

tion on patent application number 08/352,650, “System for Controlling Vertical Displacement of Agricultural Implements Into the Soil,” contact Lyle M. Carter, USDA-ARS Western Integrated Cropping Systems Research Unit, 17053 Shafter Ave., Shafter, CA 93263; phone (805) 746-6391, fax (805) 746-1619. ♦

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Tractor-mounted, moisture-sensing attachment for crop seeders. ① J-shank electrode compresses a ribbon of soil. ② Knife electrode picks up electrical current that directs the raising or lowering of ③ the scraper.

milliamperes). The result: The scraper exposes higher-moisture soil, suitable for the seeds.

When the sensors reveal that the soil is too wet, they and the scraper blade automatically rise, to probe for drier ground. Adjustable stops set limits on the up-and-down movements of the electrodes and scraper,