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# History of Crop Production, With & Without Tillage

by Rolf Derpsch

P E R S P E C T I V E

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The following is excerpted from a paper originally presented at the 1st JIRCAS Seminar on Soybean Research while the author was working for the MAG-GTZ Soil Conservation Project, Asunción, Paraguay; reprinted and edited here with permission of the author (some statistics have been updated, and new information added, in a collaboration between the editors and the author). More is available at [www.rolf-derpsch.com](http://www.rolf-derpsch.com).

Derpsch has witnessed and played a significant part in the development of no-till in South America, with work spanning four decades. He continues to have influence in many corners of the world.



Photo by Rolf Derpsch.

Small landholder in Paraguay using a planting stick, much as the ancient peoples of the Americas did—no plowing was done.

No-tillage<sup>1</sup> and minimum-tillage have been used since ancient times by the so-called “primitive cultures” for the production of crops, simply because man has not the muscle force to till any significant area of land to a significant depth by hand. To think that tillage is inherent in, or synonymous with, agriculture is a more recent and erroneous idea.

The Incas in the Andes of South America, the ancient Egyptians, as well as most indigenous cultures around the world, routinely used a stick to make a hole in the ground, put seeds in the soil by hand, and covered



Photo by Matt Hagny.

Teotihuacán, just east of present-day Mexico City, was the sixth-largest city in the world in 600 AD, and was built entirely by hand labor. Teotihuacán was the center of a civilization sustained by an agriculture that also consisted solely of hand labor (no suitable native animals were available for domestication for pulling implements). Here, the view is from atop the Pyramid of the Moon, looking along the Avenue of the Dead with the Pyramid of the Sun on the left. The Pyramid of the Sun was the largest structure in pre-Columbian America, containing over 1 million cubic meters of material; tourists appear to be specks on the enormous structure. Much of the city remains unexcavated.

the seeds with the foot.<sup>2</sup> Even today hundreds of thousands of farmers in Central and South America seed their crops using the same technology. Moreover, millions of hectares of land have been traditionally sown with a hand jab planter without tilling the soil, after burning, in the shifting agricultural system in Brazil and neighboring countries, long before the term no-tillage was introduced into the modern vocabulary. The slash mulch or “tapado” system in Central America and Mexico is another example of no-tillage developed by pre-Columbian cultures and has been used for centuries.<sup>3</sup> In this system, after a rain, seeds are thrown on top of the soil underneath a dense stand of Mexican Sunflower (*Thithonia diversifolia*) or other voluntary (or

<sup>1</sup> ‘No-tillage’ is defined in this paper as the planting of crops in previously undisturbed soil by opening a narrow slot, trench, or band only of sufficient width and depth to obtain proper seed coverage. No other soil preparation is performed. We also refer here to *permanent* no-tillage rather than not tilling the soil occasionally. “No-till” is the most common term used in the United States, while “direct-drilling” or “zero tillage” is used in the United Kingdom and Europe.

<sup>2</sup> (Editors’ Note: The “hill planting” of placing seeds in individual holes—as well as weed removal and harvesting by hand—permitted the use of mixed cultures, such as with beans, maize, and squash in the same garden or field. [from J. Harlan, 1995, *The living fields*, Cambridge Univ. Press. See also J. Diamond, 1997, *Guns, Germs, and Steel*, Norton & Co.] )

<sup>3</sup> H.D. Thurston, M. Smith, G. Abawi & S. Kearl, 1994, *Los sistemas de siembra con cobertura*, CIFAD, Cornell Univ.

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