

# GEORGE WASHINGTON CARVER AND HENRY FORD: PIONEERS OF ZERO WASTE

by John Ferrell

Today, George Washington Carver is remembered, if at all, as a kindly scientist who did "something with peanuts." But in reality, he was a visionary who—like his good friend Henry Ford—deplored the very idea of waste.

In 1893, the Iowa Horticultural Society published an article by Carver, who was then an undergraduate at the Iowa State College of Agriculture and Mechanic Arts. In it, Carver expressed a philosophy that would guide him through a long career in research and education:

*The earnest student has already learned that nature does not expend its forces upon waste material, but that each created thing is an indispensable factor of the great whole, and one in which no other factor will fit exactly as well.*

Three years after the article was published, Carver joined the faculty of Tuskegee Institute, an innovative school for blacks in rural Alabama. Under the leadership of Booker T. Washington, Tuskegee reached beyond its own campus to help poverty-stricken farm families better their lives. Carver, with his recognition that "each created thing is an indispensable factor of the great whole," played a pivotal role in this extension program. Displeased at how much money was being spent in the South on commercial fertilizers "while Nature's choicest fertilizer is going to waste," he demonstrated how people could use locally available materials—leaves from the woods, muck from the swamp, and manure from the barnyard—to enrich their soil. He also showed how they could improve their diets with under-appreciated local plants and enhance the appearance of their homes with white and color washes made from local clays.

As time went on, Carver broadened the scope of his research and his outreach. How, he asked himself, could under-valued local resources be used to create regional industries? In his effort to answer this question, he found potential in a host of unexpected places—most notably sweet potatoes and peanuts. His sweet potato creations included ink, library paste, and synthetic silk. His many peanut products included face cream, dyes, plastics—even a soap

made in part from refuse scraped off the floor of a peanut-shelling plant. Carver also used wood shavings in a marble substitute, and he worked with his young assistant, Austin W. Curtis, to create low-cost paints from Alabama clays and used motor oil.

Carver had little interest in commercializing his discoveries. In most cases, he simply pointed to possibilities for others to pursue. But few chose to follow his leads. Although the "wizardry" of creating unexpected products from plants and refuse was intriguing to reporters and the public, few understood the conviction that lay behind Carver's research from beginning to end: Since, nature produced no waste, people should not treat materials as if they lacked value or purpose.

That conviction made him a forerunner of today's industrial ecology proponents, who seek to improve industry's efficiency and environmental performance by emulating nature's own cyclical processes. They recognize that in industry, as in nature, the leftovers from one process can be food for another. So-called wastes are resources in disguise.

Renewable feedstocks, naturally biodegradable and compostable, are particularly attractive to industrial ecologists. They are also an important focus in the closely related "green chemistry" field. Again, Carver showed the way by publicizing a broad array of renewable options.

Carver shares his pioneer status with Henry Ford. The automaker found numerous ways to squeeze more value from materials used in his operations. In addition, he set a youthful team of researchers to work examining the industrial potential of soybeans. By 1934, half a bushel went into every Ford car. The exterior enamel had a soy oil base, and soy meal was used in such parts as the plastic gearshift knob and horn button.

Ford, like Carver, was a leading figure in the chemurgy ("chemistry at work") movement, which emerged in the 1930s to advocate greater use of farm and forest resources in industry. Ford and Carver first met in 1937 when the Tuskegee researcher traveled to Michigan to attend a national chemurgy

conference. The industrial titan and the black professor quickly developed a close friendship based on shared interests and philosophy.

Carver was particularly impressed with Ford's attitude toward waste. When the automaker visited Tuskegee after a stay at his winter estate in Ways, Georgia, he ordered his chauffeur to recover a bottle that had fallen out of his car. Recalling the incident, Carver observed that

*[Ford] owns about seventy-five thousand acres of land in Ways....He had torn down an old cabin on this land and had picked up this bottle underneath that house—and he said that it was valuable to him, we can use it. He took it way back to Michigan. I looked at it and said, "Well, well, there is the richest man in the world picking up an old dirty bottle to carry back to Michigan...."*

But what about the cabin? Although its fate did not figure in Carver's story, Ford very likely made sure that the lumber from the demolished building was saved and put to good use. After all, Ford—who owned his own forests and used wood extensively in his operations—was an old hand at eliminating wood waste. In *Today and Tomorrow* (1926), a book he wrote in collaboration with Samuel Crowther, he described his approach:

*We treat each tree as wood until nothing remains which is serviceable as wood, and then we treat what remains as a chemical compound to be broken down into other chemical compounds which we can use in our business.*

*We save, not only lumber, but also we save transport by the carriage of wood instead of wood mixed with water—green wood. More than that, we carry only finished wood—parts all ready to go into assembly. Instead of paying freight on waste, we keep the waste and earn money from it.*

The automaker said his work in this area had begun just six years before. Already, he had discovered that "in our forests and sawmills..., instead of wasting at least half of the tree—which is usual—we need waste not a bit of the tree." The techniques used to reach this goal included the use of saws that allowed cutting trees close to the ground and a new method of milling that "reduced waste and scrap to negligible quantities." Much of this "negligible" residue ended up at a wood-distillation plant, where each ton yielded "135 pounds of acetate of lime, 61

gallons of 82 percent methyl alcohol, 610 pounds of charcoal, 15 gallons of tar, heavy oils, light oils, and creosote, and 600 cubic feet of fuel gas."

According to Ford, his company was "saving nearly one hundred million feet of wood a year by the salvage of old lumber." All scrap wood ended up at a wood salvage department. There workers sorted it by size and quality, removed nails and spikes, and cut it into standard widths, lengths, and thicknesses. Some of this reborn lumber was sent to a company box factory, and some found other purposes within the Ford plants.

Ford applied a similar process of analysis to other materials, and the results were similarly impressive. In *Today and Tomorrow*, he observed that "We have a large salvage department, which apparently earns for us twenty or more million dollars a year." But, he recalled, "as that department grew...we began to ask ourselves: 'Why should we have so much to salvage? Are we not giving more attention to reclaiming than to not wasting?'"

Those questions led to an analysis of Ford processes, and out of that analysis came innovations such as this one:

*We formerly cut our crank cases out of trimmed steel plate exactly the width and length of the case. That steel cost \$.0335 per pound because it had in it a good deal of labor. Now we buy an untrimmed sheet 150 inches long at \$.028 per pound, shear it to 109 inches—the sheared portion going to make another part—and on the remaining plate we can lay our five crank cases, which are cut in one operation. This saves four million pounds of steel scrap a year, and the whole saving amounts to nearly half a million dollars.*

By 1930, the Ford war on waste was so far advanced that the *New York Times*, in an article headed "Ford By-Products Worth \$19,000,000," observed that "in the Ford plants nothing is thrown away. After the raw materials—and even the smoke—have served their purposes in the production of automobiles, they are made to yield vast quantities of still other raw materials which are either employed in the plants or sold in the market."

Seven years later, when Ford met George Washington Carver, both men were in their seventies and nearing the end of their remarkably productive careers. It is interesting to speculate on what might

have happened had they met earlier or lived longer. Would they have worked together to promote renewable resources and urge a societal goal of zero waste? We will never know. But today, as the concept of sustainability takes hold in more and more industries, Ford and Carver's individual contributions are worthy of note. As Carver said, "I am a blazer of trails....Others must take up the various trails of truth and carry them on."

**John Ferrell is author of *Fruits of Creation: A Look at Global Sustainability as Seen Through the Eyes of George Washington Carver* (Macalester Park Publishing Co., 1995). He served on the staffs of *RAIN: Journal of Appropriate Technology* and the California Office of Appropriate Technology.**

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