

**Green roofs a growing technology in U.S. cities**  
Baltimore among towns plotting gardens overhead  
*The Baltimore Sun*

*By Lane Harvey Brown*

*Sun Staff*

*Originally published May 26, 2002*

From the roof of his Harford County barn, farmer Ed Snodgrass is using coconut husks, car-bumper liners and heat-treated rock mixed with plants and filters to study the future of urban America.

Snodgrass is a nationally known expert on green roofs, an emerging technology in the United States that replaces hot asphalt with cool plants.

"I have to do so much of my own research," said Snodgrass, 50, who is growing the plants for a 30,000-square-foot roof at Montgomery Park, a \$75 million redevelopment project in Southwest Baltimore. "There aren't any green roofs in America that have been up for more than a few years."

Though the environmentally friendly style is in its infancy in North America -- no one is even sure how many have been planted -- it's all the rage in Europe, especially Germany, where residential, industrial and school rooftops are swathed in green, and laws require new buildings to include green roofs.

In an increasingly paved-over urban world, the roofs' popularity stems from their ability to capture storm water, conserve energy, prolong roof life and lower temperatures inside buildings and around them.

The concept is built in large part on common sense, advocates say. "Basically, cities are dressed in dark clothes," said Jessica Rio, spokeswoman for the Chicago Department of the Environment, which has installed a green roof at City Hall.

Dark roofs fuel heat and storm water runoff. They expand and contract wildly (and wear out faster) in harsh surface temperatures that swing by as much as 100 degrees on the hottest days. And they raise surrounding air temperatures in a phenomenon researchers call the heat-island effect.

### **Carpet-like surface**

Dressing roofs with lighter-colored plants creates a carpet-like surface that can absorb half or more of normal rainfalls, greatly reducing runoff. Green roof temperatures remain steadier, about 75 to 80 degrees in the summer, which can help roofs last four to five times longer, Snodgrass said. Early studies suggest they can help cool the air around them, too.

Montgomery Park, former East Coast distribution center for Montgomery Ward, will become the home of the Maryland Department of the Environment (<http://www.mde.state.md.us/>) and the Maryland State Lottery. It will also contain two green roofs. The larger one, about 20,000 square feet, is to be planted next week and will be among the largest on the East Coast, Snodgrass said.

The state Department of Natural Resources has provided a \$100,000 grant to help pay for the roof. The total cost has not been calculated.

A second, 10,000-square-foot roof will be installed later.

Snodgrass' staple roof plants are sedums -- sturdy succulents that thrive in harsh conditions and live "virtually forever" by shedding cuttings, or tiny sprigs, that regenerate, he said.

He will work with Jay Noble, owner of Noble's Landscape Service in Baltimore, to devise the planting strategy for the 65,000 plants Snodgrass has grown for the Montgomery Farm project at his farm in Street.

The roof material is made up of a series of layers, about 3 inches deep, which protects the rooftop and provides growing area. Waterproof material goes on the bottom, followed by filter cloth that lets water -- but not soil -- pass through. Then insulation, more filter cloth and a thin soil layer. On top is spread a thick layer of expanded slate, which has been heat-treated to make it lighter and more porous.

Once the plants, some with reddish foliage, others with yellow and white flowers, are established, little maintenance is necessary, Snodgrass said. The roots will twine into the slate's tiny holes as they grow.

And that's the beauty behind green roofs, experts say: The no-fuss, no-frills covering requires little work but yields a big environmental bang for the buck.

When the green roof is completely planted and soaking wet, it will add about 15 pounds per square foot to the roof weight, Snodgrass said.

Much remains to be learned about the benefits, said Bill Hunt, engineer and extension specialist at North Carolina State University, one of a handful of schools studying green roofs.

"If you want to find research in its infancy, this is it," he said, noting that N.C. State is studying the quantity and quality of water that comes off green roofs. Michigan State University is studying plant material, and Penn State University is looking at insulation and runoff issues.

Early evidence looks promising. A study done by Roy F. Weston Inc., an environmental consulting and engineering firm in West Chester, Pa., for the city of Chicago found that if

30 percent of the roofs were green, the city could save about \$100 million a year in energy costs, said Weston project director Sandra McCullough.

She said the roof insulates so well that energy costs can be cut in half in the summer and about 25 percent in the winter.

Chicago officials used the study as impetus to plant a green roof at City Hall. Part of the U-shaped building still has a conventional blacktop roof.

The planting, 20,000 plants in 20,000 square feet, has been finished for about a year, and the roof is "pretty much totally covered," said Rio, the Chicago energy department spokeswoman. Along with plants, the roof is replete with birds, butterflies, dragonflies and grasshoppers.

Rio said energy department researchers, using infrared thermometers to measure roof temperatures, have found that on a 100-degree day last summer, the blacktop roof was 165 degrees, while the green roof was 85.

Robert Goo, environmental protection specialist in the EPA's Office of Water, said the technology offers "tremendous opportunities" for expansive flat-roof buildings, such as Ford Motor Co.'s 480,000-square-foot River Rouge plant in Michigan, which is getting a \$2 billion overhaul that will include a green roof.

### **Blunting runoff's impact**

Green roofs "are one tool that can be used to decrease impacts of runoff and, particularly, flow to streams in urbanizing areas," said Goo. "They have the potential to decrease pollution borne in the air," such as acid rain, by collecting and filtering contaminants in rainwater.

The storm water that runs off a green roof moves more slowly and is cooler, said Charlie Miller, civil engineer and president of Roofscapes, a Philadelphia-based green roof design and installation company.

The field is new enough that Snodgrass, whose other projects include green roofs at Harvard University, a public library in Skokie, Ill., and Harford Community College, is one of only a handful of green-roof plant growers in the nation. A former dairy and grain farmer, Snodgrass saw the green-roof wave coming to America in the mid-1990s, so he positioned his farm business squarely in front of it.

He spends most of his day on the barn roof or in his greenhouse, studying plants and things such as coconut husks and bumper liners, which could be used as a growing medium. He guesses he has grown about 250,000 plants.

The rest of his time is spent answering inquiries, which are increasing all the time. The fifth-generation farmer says he looks forward to the day when green roofs take root

as firmly in North America as they have in Germany.

"I'm excited about flying into BWI or Toronto and seeing all those long, flat roofs covered by green roofs," he said, as storm clouds began dropping thick splats of rain on his greenhouse roof. "That's more my world view."

Copyright © 2002, The Baltimore Sun (<http://www.sunspot.net>)

posted by Stu Sirota