

Could rice hulls be a valuable commodity?

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By P. J. Hirshey

Arkansas is the nation's leading producer of rice, harvesting some 10 billion pounds per year. Arkansas is also the nation's leading producer of rice hulls, which account for about 20 percent of that weight.

Rice hulls have a few low-value uses as a filter product and bedding material for chicken houses, but they are mostly a disposal problem. Several University of Arkansas Division of Agriculture research projects are looking for higher-value uses.

Associate professor Michael Evans in the UA department of horticulture has found that parboiled rice hulls show excellent promise for use in plant growing media.

Despite the fact that they are commonly called potting "soils," most plant growing media contain little or no soil. They are generally comprised of a variety of substances, such as composted bark and manure, peat moss and inorganic products like perlite and vermiculite.

"All of these components are blended to create a mixture with the right set of physical and chemical properties based on what it is being used for," explains Evans. "It must hold water and nutrients, but at the same time provide air-filled pore spaces and good drainage. And it has to remain inexpensive for consumers."

Perlite is a lightweight volcanic rock derivative commonly used in growing media to increase water absorption and air-filled pore space. However, perlite tends to be dusty and difficult to handle, as well as expensive.

"In a bag of growing medium that contains 20 percent perlite, half of the cost of that medium can be the perlite," Evans notes. "If we can find a less expensive alternative, that would mean a significant savings in cost, particularly to large commercial growers."

In the past, it was thought that fresh rice hulls would be an unsuitable substitute for perlite because of the potential for weed seeds and the fear that they would cause what scientists call "nitrogen tie-up."

"The process of decomposition requires a lot of nitrogen," explains Evans, "and it was thought that materials with a high carbon to nitrogen ratio, like rice hulls or sawdust or corn cobs, would take the required nitrogen from the soil and out-compete the plant for fertilizer."

"What we've discovered is that the key is not just the carbon to nitrogen ratio of the material that dictates whether nitrogen tie-up will occur. There must also be a fairly rapid rate of decomposition."

In tests, after two months of being used in growing media, rice hulls showed no decomposition and no significant nitrogen depletion, even when they constituted as much as 60 percent of the media.

To solve the problem of weed seeds in the hulls, Evans discovered that hulls that were parboiled before the grain was removed had no viable seeds remaining.

"We found that parboiled fresh rice hulls are an excellent substitute for perlite. They are a low-cost, clean, consistent product," Evans says. "It is my guess that within the next 12 months, we will begin to see growing media on the retail and commercial markets that contain parboiled fresh rice hulls in place of perlite."

Evans is also testing rice hulls as a medium for hydroponic gardening. Hulls have many of the same properties as sand or rockwool, two common hydroponic media. "If the hulls could be bagged and sold as a hydroponic medium, that would provide another market for them," he says.

He is also experimenting with growing plants in a medium made of only rice hulls. The large pore spaces that whole rice hulls provide are very desirable when combined in traditional media with substances that retain water well, like peat moss. But because whole rice hulls don't hold water well, plants grown in them require several waterings per day.

Evans points out that water retention is simply a function of pore space. Smaller particles equal smaller pore spaces and therefore greater water retention. He plans to test mixtures of whole and ground rice hulls to find the ideal balance of drainage and water retention.

The ground hulls have physical properties similar to peat moss and could also be used in traditional media as a substitute for peat. As an additional benefit, grinding kills any remaining viable seeds in the hulls, so non-boiled fresh hulls could be used for this.

The focus of all of Evan's research is to take a waste product and develop a use for it that will benefit producers and consumers.

"I would love to see the day when, instead of importing peat mined in Canada, rice hulls are being shipped from Arkansas around the country for use in growing media," says Evans. "That's my goal."

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