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Rethinking "Waste " in a Circular Economy

During a recent visit to Kottayam in Kerala , I met a small citrus grower whose orchard offered a quiet but powerful lesson in sustainability. The lemon trees looked incredibly fresh and vibrant. Their leaves were deep green, shining with health. As someone from an agriculture background, I could immediately sense the visible vitality that spoke of balanced nutrition and healthy soil.

While walking through the orchard, I casually asked him about his nutrient management practices. I was expecting the usual answer. Instead, he smiled and said something I did not expect at all. "I use hair," he said.

I must admit, I was surprised. Seeing my reaction, he laughed gently and explained . He collects discarded hair from nearby barbershops and, just before the monsoon (june-july) , buries about one kilogram around each tree in shallow trenches along the drip line. The hair is covered with soil and left to decompose naturally-no processing, no machinery, no external inputs. Just patience and trust in the soil. At first glance, this may sound unconventional. But from an environmental perspective, it is a compelling example of circular resource use.

Reframing Waste as a Resource

Citrus crops such as lemon and orange are perennial trees with year-round nutrient demands. Among all essential nutrients, nitrogen plays a central role in leaf development, chlorophyll formation, shoot growth, and overall yield. When nitrogen is deficient, trees exhibit yellowing leaves, stunted growth, and reduced productivity.

However, excessive use of chemical fertilizers presents its own challenges. Rising input costs, nutrient leaching, declining soil health, and environmental concerns are pushing farmers to search for sustainable alternatives. In this context, an unconventional yet

scientifically supported practice is gaining attention the use of human hair as a slow-release nitrogen source.

That is where this simple practice becomes interesting.

The Science Behind the Practice

Scientifically speaking, human hair contains about 14–17 percent nitrogen (Robbins, 2012). This nitrogen is locked inside keratin — a strong structural protein that breaks down slowly. Research studies (Rahman et al., 2016; Zheljazkov, 2005, 2008) have shown that hair can act as a slow-release nitrogen source. Slow nutrient release, as discussed by Volkmar et al. (1998), reduces leaching losses and supports steady plant growth.

However, decomposition is not immediate. Because keratin is tough and resistant, hair may take around 1 to 1.5 years to fully decompose, depending on climate, soil moisture, microbial activity, and temperature. In humid tropical conditions like Kerala's, monsoon moisture and active soil microbiology gradually break down the material over 12–18 months.

If faster decomposition is desired, hair can also be added to vermicompost systems. When mixed with organic wastes and processed by earthworms, the physical breakdown and microbial activity can accelerate decomposition and nutrient release. In this way, hair becomes part of a more readily available organic nutrient source.

But beyond all the scientific explanations, the strongest evidence was right there in front of me — the trees themselves.

The farmer reported that after adopting this method, the foliage appeared darker and greener, shoots were stronger, and overall vigor improved. The soil retained moisture for longer periods and weed growth was comparatively less. Most importantly, he reduced his dependency on expensive synthetic fertilizers.

What many consider waste from barbershops became a valuable agricultural input. This transformation reflects the principles of circular agriculture where waste materials are integrated into production systems, minimizing loss and maximizing resource efficiency.

A Lesson in Sustainable Innovation

This experience highlights an important truth: agricultural innovation does not always originate in laboratories. Often, it begins in farmer's fields through observation, experimentation, and a deep understanding of the land. Farmers often discover solutions that science later explains.Using human hair in citrus cultivation may not completely replace other nutrient sources, but it clearly shows the potential of locally available organic materials in integrated nutrient management.At a time when input costs are increasing and sustainability is no longer optional, such practices deserve attention. They teach us that improving soil health is not always about adding more — sometimes it is about using what we already have, more wisely.

Turning barbershop waste into citrus wealth is more than a clever idea. It is a reminder that sustainable agriculture begins with respect - respect for resources , for ecological balance, and for the soil that ultimately sustains us all.

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