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Opinion

Revitalizing Human Health can be Achieved through Herbal Microgreen Permaculture

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Opinion

Amid what seems to be ever expanding globalization and large business consolidation of resource control, populations worldwide have quietly promoted a movement to purchase local, organic, seasonal, and sustainable food. Organic produce has higher nutrient content due to soil quality and the need for plants to support and defend themselves from pests and environmental challenges. For example, recent studies have shown that organic peaches and pears have higher levels of fat and water-soluble vitamins, and organic berries and corn have more of the phenolic antioxidants that protect humans from age-associated disease [1].

Microgreens are a tiny form of young edible green produced from vegetable, herb or other plant seeds. They are easy to grow in an urban setting and organically because of their short growth cycle. A microgreen has a single central stem which has been cut just above the soil line during harvesting. It has two fully developed cotyledon leaves and usually one pair of very small, partially developed true leaves. They range in size from 1″ to 2″ long, including the stem and leaves. These nutrient rich plants can be traditional herbs like basil or traditional food plants like spinach. Microgreen farming is a substantial component of urban farming, a form of farming that has seen exponential growth. Urban farming currently produces an astonishing 15 to 20 percent of the world's food [2].

Microgreens are ideal for those with a limited growing space, since feet instead of acres are all that is required to grow a crop packed with the distinctive flavor of the mature plant in quantities relevant to human nutrition. On a slightly larger scale, herbal microgreens like basil, catnip and mustard make a profitable commercial crop and are known for their more intense flavor compared to full grown plants.

Food production has been estimated to utilize 50% of land and to be responsible for 80% of total freshwater consumption [3]. In some regions this consumption occurs at a rate that is faster than aquifer recharge. Small scale farming allows for more attention to sustainability. For most crops, soil is an important source of nutrients for the herb or crop plant. Since microgreens are harvested prior to secondary vegetative growth, soil quality is less important.

Although soil microgreen growth creates a nutrient dense plant, new approaches to microgreen propagation have begun to be utilized. For example, hydroponics is a simple space efficient method for microgreen propagation. Hydroponics requires few resources, and only moderate amounts of water. This perhaps is the most sustainable and cost-effective approach to microgreen growth. Beginner farmers need little more than reusable growth trays, humidity domes, pads, and a water source. Hydroponic growing pads are sowed with seeds and hydrated with sterile deionized water or a hydroponics solution nutrient system (e.g. NPK ratio of 2-1-6). Growth often occurs in a manner like growth seen using traditional soil. For example, seeds can be pre-soaked in the dark or seed sown trays kept in the dark until germination by placing in a dark location or covering trays with a material like aluminum foil. After germination, growing trays are covered with clear humidity domes and incubated under plant bulbs for 12-24 hours of light daily. Full spectrum bulbs providing lux intensity of 2000-6000 promotes efficient growth.

An additional alternative approach to traditional soil-based growth is the use of agricultural waste, ideally without composting. By skipping the composting step, time, space and money can be saved which is of importance to both small scale and urban farmers. Current work at National University of Health Sciences (NUHS), in collaboration with the UPC partnership at St. Petersburg College is focused on identifying opportunities for using spent (used) mushroom substrate for plant growth, directly, with no composting. As with other nutrient dense wastes, spent mushroom substrate is commonly disposed of by incineration, composting, or as a food for various organisms like earthworms, pigs, and additional livestock [4].

As an efficient option for disposal of spent mushroom substrate, current work at NUHS takes oyster mushroom substrate and uses it directly as a growth medium for herbal microgreens (unpublished data). For example, in one set of experiments, oyster mushrooms (Pleurotusostreatus) were grown on 90% straw, 9% coffee ground waste, 0.9% wheat bran, and 0.1% limestone. After inoculation with seed spawn, substrate was placed into 6-inch (diameter) filter patch bags and incubated in the dark for an 18-day spawn run

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at a temperature of seventy-five degrees Fahrenheit. Mushroom pinning was initiated using a 48-hour cooling cycle at fifty degrees Fahrenheit. Fruit body development occurred in 95% humidity, 8h 1000lux full spectrum LED lighting, with ~6 air exchanges/24h. Depending on fruiting run, efficiency of mushroom growth varied between 130 and 150%, by wet weight. Following fruiting spent substrate lost an average of 39% dry weight.

For microgreen preparation the spent mushroom substrate was pressure cooked for 2h at 10 PSI prior to being used. Microgreen development of arugula, basil, catnip, cilantro, peppermint and spinach was compared among 3 soil-types. First, 100% compost soil was used, with plant growth in this media set as 100% for growth efficiency comparisons. Second, the plant cultivars were grown in 100% spent oyster mushroom substrate, with no soil. Third, plant cultivars were grown in spent oyster mushroom substrate, with 2mm compost soil placed over the plant seeds. Prior to planting, seeds were soaked for 36 hours in deionized water. Following planting at a seed density of 20-30 seeds per square inch, plants were grown in 75% humidity with 12h/day, 2000lux full spectrum LED lighting. When grown in 100% spent oyster mushroom substrate layered with 2mm of soil on top, 96-97% growth efficiency was achieved with arugula, basil, catnip, cilantro, and peppermint. Yield was not significantly different from yield in 100% compost soil.

When grown in 100% spent oyster mushroom substrate alone, without 2mm of composted soil on top, growth efficiency was sixty-seven percent for arugula, eighty one percent for basil, seventy two percent for catnip, eighty four percent for cilantro, and seventy eight percent for peppermint. Results show that spent oyster-mushroom substrate can serve as an efficient substrate when covered with a 2mm layer of compost soil. In addition, the average efficiency of herbs grown without any top soil was 76 percentage of herb growth in 100% control composted soil. Although unsuccessful with spinach, high yield was achieved with arugula, basil, catnip, cilantro and peppermint, showing that this ecologically friendly approach to resource conservation warrants further examination and has value in space-challenged environments like urban farming. Additional experimentation should answer several important questions. First, will spent mushroom substrate work as a growth medium for a wider spectrum of herbal and food-based microgreen crops? Second, could herbal microgreen waste be used as an efficient substrate for additional cycles of mushroom growth? Third, and of nutritional importance, how does microgreen nutrient content change with different growing mediums?

The question of nutritional variation based on growth medium has particular importance since published data suggests there may be a difference. For example, Weber [5] examined the mineral concentration of broccoli microgreens produced using compost-soil based and hydroponic growing methods. The harvested dry mass of broccoli microgreens did not differ, but mineral content was dependent on growth method. For example, compost-grown microgreens had significantly greater amounts of K, Ca, Mg, Na, Zn, Mn, Fe, Cu, and Al than hydroponic microgreens.

The way we eat and the way we produce food can ensure high nutrient density and improve our health while building community wealth and environmental sustainability. By using hydroponics or combining spent mushroom substrate and herbal microgreen propagation, agricultural waste is lowered and conservation achieved.

References

1. Asami DK, Hong YJ, Barrett DM, Mitchell AE (2003) Comparison of the total phenolic and ascorbic acid content of freeze-dried and air-dried marionberry, strawberry, and corn grown using conventional, organic, and sustainable agricultural practices. J Agric Food Chem 51(5): 1237-1241.
2. Catherine W (2003) Urban agriculture helps combat hunger in India's slums.
3. Dana G (2012) Wasted: How America is losing up to 40 percent of its food from farm to fork to landfill. NRDC Issue Paper.
4. Szmidt RA (1994) Recycling of spent mushroom substrates by aerobic composting to produce novel horticultural substrates. Compost Science and Utilization 2(3): 63-72.
5. Weber CF (2017) Broccoli Microgreens: A mineral rich crop that can diversify food systems. Frontiers in nutrition 4(Article 7): 1-9.

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