

Living Filtration: Humidity Correction Without Plumbing

Plants add moisture to dry conditioned air. No humidifier. No maintenance.

At a Glance

Plant leaf surfaces absorb particulate matter and volatile organic compounds. Soil microbes metabolise VOCs. A palm cluster also filters the air. Cooling and air quality from one system. [1]

Summary

Plants filter air through three mechanisms. First, particulate interception: particles in air contact plant leaf surfaces and adhere to them. A mature areca palm with LAI of 3 (3 square metres of leaf tissue per square metre of footprint) provides 3 square metres of interception surface. In a space with 200 people, the cluster continuously filters a portion of the 400 to 600 cubic metres of room air that cycles through the breathing zone per hour. [1]

Second, volatile organic compound (VOC) absorption: leaf stomata and the plant's epidermal cells absorb gaseous VOCs like formaldehyde (from furniture and carpets), benzene (from cleaning chemicals), and toluene (from paints and adhesives). The NASA Clean Air Study (1989) quantified that houseplants remove 87 percent of VOC content in test chambers over 24 hours. The mechanism is both physical absorption and metabolic uptake by the plant tissue. [2]

Third, soil microbial metabolism: the rhizosphere (the soil immediately surrounding roots) contains billions of microorganisms. These microbes metabolise absorbed VOCs, converting them to CO₂, water, and biomass. The plant-soil system is a living bioreactor. Terrapods in Thermopod installations contain active soil microbiota because the soil is kept moist and aerated. The microbial community continuously processes VOCs absorbed by the plant. [3]

The result for Biothermal Microconditioning is dual function: cooling from evapotranspiration and air quality improvement from filtration and metabolism. A single cluster provides both. No separate air purifier. No filter replacement. No electricity for air handling. Biothermal systems are multifunctional. Easy Retrofit. One day. The office is cooler and cleaner immediately. [4]