Agroforestry Business Model Innovation Network

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Biochar from Agroforestry for Bioeconomy Material Applications

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Biochar has a wide range of applications and, due to its porous properties, can be used as a filter material in drinking water treatment.

Due to their high biomass productivity, agroforestry systems can provide woody biomass in a particularly land-efficient, resource-conserving and cost-effective manner. The growth rates of trees growing in agroforestry are in some cases significantly higher than those of trees growing in forests due to a better utilization of light, water, and nutrient resources because a lower competition with other trees happen. In addition, pruning also represents a source of woody biomass. Therefore, the utilization pressure on near-natural forest ecosystems can be reduced by spreading agroforestry systems over large areas. Wood processing also produces lignin-rich raw-materials and residues that can be further commercialized.

Significant quantities of biochar can be produced from all these natural organic raw materials by means of thermal treatment under low-oxygen conditions. The biochar produced in this way has extremely versatile properties and usage potentials that are relevant from a bioeconomy perspective. More than 50 possible applications for biochar have already been identified, e.g. as filter material for wastewater, drinking water and exhaust gas treatment or as a bio-based raw material for food, pharmaceuticals, cosmetics, paints and textiles. In addition, biochar can be used for insulation, decontamination and regulation of humidity in buildings or as a raw material for other industrial applications. Practical examples already exist for many of these areas of application, so it can be assumed that there is a market demand and corresponding sales opportunities exist.

However, the requirements for the biochar demanded can differ in terms of its properties, quality and quantities. Modern pyrolysis plants, which can efficiently and cost-effectively produce scalable quantities of biochar with different properties under modifiable process conditions, offer a practical approach at local, municipal and regional levels.

As a conclusion, by refining woody biomass from agroforestry systems into high-quality biochar, the bioeconomy opens up numerous utilization opportunities within diverse agroforestry value chains that help to mitigate climate change.

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