

Research and development of key technologies for the ecological planting and breeding model of "sanglin introduction and breeding to increase income-functional mulberry feed development to reduce carbon emissions-green breeding to reduce emissions" in difficult areas in Guangdong Province

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Abstract: Revitalizing and excavating difficult site areas with basically zero carbon sequestration capacity, enhancing the carbon sink function of difficult site land, is of great significance for achieving the "dual carbon" and "beautiful China" strategies. By conducting screening, cultivation, and ecological planting and breeding models suitable for difficult site areas, we aim to enhance the carbon sequestration function of these areas. Difficult site areas, due to harsh environments or unreasonable human activities, have suffered damage to their ecosystems, making them a typical area with extremely low utilization rates, severely inadequate carbon sink functions, and serious constraints on the implementation of the "Beautiful China" strategy. Guangdong Province has a large area of difficult sites, mainly including coastal saline alkali land, the Dabaoshan mining area in northern Guangdong, and the inferior red bed desert (commonly known as Niugan Land) in the Nanxiong Basin. Plants are the primary factor in achieving or improving carbon sequestration in difficult areas, but there is a shortage of varieties and difficulty in forming forests in these areas, making them an important link in enhancing carbon sequestration capacity in these areas. Mulberry trees have the characteristics of strong adaptability, salt alkali resistance, barren tolerance, resistance to various heavy metals, rapid growth, and large biomass. Their annual fixed CO₂ amount is 49291.7 kg/hm², equivalent to pure carbon of 13467.7 kg/hm², which is higher than most trees in terms of carbon sequestration capacity. Therefore, mulberry trees have the characteristics of both poor habitat tolerance and high carbon sequestration capacity. At the same time, mulberry branches and leaves contain various active substances that have the function of improving immunity and inhibiting glucose and lipid metabolism in animal feeding. This can increase carbon sequestration by reducing the amount of medication used in animal feeding. In addition, after harmless treatment of animal manure generated by green farming, it is returned to the mulberry forest, which not only reduces pollution but also partially replaces industrial fertilizers, and greatly increases carbon sink increment.

Focusing on the three goals of "increasing foreign exchange, reducing carbon emissions, and reducing emissions", starting from the three ends of "ecological carbon fixation, raw material production, and industrial consumption", we will construct an artificial planting and breeding cycle model of "mulberry forest introduction, functional feed development, and green aquaculture" that synergizes multiple factors of green ecology and economic improvement. We will propose a solution for the ecological utilization of difficult site areas that connect and support "variety agriculture industry", Provide new theories, technologies, and models to support the improvement of carbon sequestration capacity in difficult site areas and the implementation of strategies such as "Beautiful China" and "Green Guangdong".

广东省困难立地区域“桑林引育增汇-功能桑饲料开发降碳-绿色养殖减排”生态种养模式关键技术研发

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摘要: 盘活和挖掘固碳能力基本为零的困难立地区域, 提升困难立地土地的碳汇功能, 对于实现“双碳”与“美丽中国”战略意义重大。通过开展适用于困难立地区域林木品种的筛选、培育与生态种养模式构建, 完成困难立地区域碳汇功能的提升。困难立地区域由于环境恶劣或不合理人类活动, 生态系统受到破坏, 是利用率极低、碳汇功能严重不足以及严重制约“美丽中国”战略实施的典型区域。广东省困难立地面积较大, 主要包括滨海盐碱地、粤北的大宝山矿区、南雄盆地的劣地式红层荒漠(俗称牛肝地)等众多类型。植物是困难立地区域碳汇功能实现或提升的首要因子, 然而困难立地区域存在品种缺乏、不易成林的困境, 因此是提升困难立地区域碳汇能力的重要环节。桑树具有适应能力极强、抗盐碱、耐瘠薄、耐多种重金属及速生快长、生物量大的特性, 其一年固定的CO₂量为49291.7 kg/hm², 折合纯碳为13467.7 kg/hm², 固碳能力高于大部分林木, 因此桑树兼具耐不良生境与高固碳能力的特性。同时, 桑树枝叶中包含多种活性物质在动物饲养中具有提高免疫力、抑制糖脂代谢的功能, 可通过减少饲养动物的用药量提高碳汇增量。此外, 绿色养殖产生的动物粪污做无害化处理后, 回归桑林, 既减少污染又部分替代工业化肥, 也会大大提升碳汇增量。围绕“增汇-降碳-减排”三个目标, 从“生态固碳端、原材料生产端、产业消费端”三端同时切入, 构建绿色生态与经济提升多要素协同的“桑林引育-功能饲料开发-绿色养殖”的人工种养循环模式, 提出“品种-农艺-产业”衔接配套的困难立地区域生态利用解决方案, 为困难立地区域碳汇能力提升以及“美丽中国”、“绿美广东”等战略实现提供新理论、新技术和新模式支撑。

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