探討遮光處理對於茶樹(*Camellia sinensis*)芽

成分、形態及基因表現之影響

蔡尚文 (5143)

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大綱

一、前言
二、遮光促進茶樹根部生成茶胺酸與新芽之茶胺酸分布
三、遮光導致茶葉 *CsPPO3* 增加促使兒茶素轉化為茶黃素
四、遮光強度對於茶樹新芽之形態、顏色特徵及化學成分的影響
五、結論

摘要

透過在茶樹上進行遮光處理來控制光照強度，可以產出具有良好感官品質茶葉。因此本篇探討遮光處理和自然光照比較下對於茶樹新芽的形態、顏色和化學成分影響。茶樹經遮光培養後，測量新生茶芽長度、重量及葉片形態，以分光光度計檢測葉綠素含量及透過多酚氧化酶(polyphenoloxidase, PPO)將兒茶素氧化生成茶黃素計算其總活性量，以高效液相層析(high performance liquid chromatography, HPLC)測量兒茶素、咖啡因與胺基酸含量，使用(ultra-high performance liquid chromatography-quadrupole time-of-flight mass spectrometry, UPLC/Q-TOF/MS)檢測茶黃素含量，qReal-Time RT-PCR 測量茶胺酸生物合成途徑之基因、胺基酸轉運蛋白 *CsAAPs* 以及多酚氧化酶 *CsPPOs* 基因表現量。與對照組相比，遮光處理後游離胺基酸含量明顯提升，其中占比總游離胺基酸 50% 以上的茶胺酸含量，於嫩莖中顯著增加，於嫩葉中減少。與茶胺酸生物合成途徑之基因表現量上升，並顯著影響 *CsAAPs* 於茶樹各部位之基因表現量。經遮光處理後發現總兒茶素含量降低，茶黃素含量顯著增加，也造成 PPO 酶活性顯著增加，並促進 *CsPPO3* 表現。測量 CsPPO3 重組蛋白之活性，判斷其可能為遮光下 PPO 主要活性來源，負責將兒茶素氧化產生茶黃素。於形態外觀上發現遮光處理後葉片厚度和單位面積葉片乾重(Leaf dry mass per unit area, LMA)顯著下降，葉綠素含量以及常見測量葉綠素之指標 Soil and Plant Analyzer Development (SPAD)值顯著增加。綜合上述，遮光處理造成新生茶芽顏色上和化學成分的改變，估計有益於生產高品質和高價格茶葉產品。

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