利用gibberella屬絲狀真菌生產激博素

李延卿、陳鴻章

E-mail: 8809446@mail.dyu.edu.tw

摘 要

本研究以生產激博素之絲狀真菌Gibberella fujikuroi CCRC 32512及CCRC 32513，先利用一次只改變培養條件中一個因子之方式探討培養環境如菌絲密度及均質時間、接菌量、發酵容積、振盪轉速、生長溫度等對生產激博素之影響。就菌絲密度而言，G. fujikuroi CCRC 32512及CCRC 32513 兩菌株以刮入0.6 g菌絲施以240 sec均質處理可得最高量之激博素，產量分別為130.31 mg/L 及 140.31 mg/L。在接菌量方面，則兩菌株皆以接入4% (v/v) 懸浮菌絲量於 50 mL 培養液中進行發酵時有最大激博素產量。就發酵容積而言，發酵容積為50 mL 時兩菌株有較高之激博素產量，分別為76 mg/L 和 98 mg/L。振盪轉速對於激博素之生產亦有顯著的影響。例如，G. fujikuroi CCRC 32512 及 CCRC 32513 在250 rpm下，其激博素產量分別為 96 mg/L 和145 mg/L，係 100 rpm 時激博素產量的 1.7倍及 2.0 倍。就生長溫度而言，在 31 °C 的溫度環境下，兩菌株有較高之激博素產量，分別為 74 mg/L 和118 mg/L。 由以上結果另外得知G. fujikuroi CCRC 32513 無論在發酵容積、振盪轉速及生長溫度方面的整體表現均優於G. fujikuroi CCRC 32512，因此選擇前者繼而探討培養基組成如碳、氮源種類及濃度、緩衝劑添加量等對生產激博素之影響。就緩衝劑添加量而言，以添加 0.5 g/L 磷酸氫鈉和1.0 g/L 磷酸氫二鉀之用量時有最大之激博素產量。就碳源而言，Gibberella fujikuroi CCRC 32513 以蔗糖為最佳之碳源種類，而含量以添加 40 g/L 為最佳。就氮源而言，此菌株以蛋白?洵偶?帑磨翩A而含量以添加 12 g/L 為最佳。而若以最適化條件組合培養 Gibberella fujikuroi CCRC 32513七天後其最大激博素產量達 289 mg/L，是基本培養條件培養相同菌株最大產量的 3.1 倍。 此外，本研究亦利用L16(215) 直交表探討培養 Gibberella fujikuroi CCRC 32513之培養環境和培養基組成之因子主效應和因子間交互作用關係。先由第一次直交表設計及變異數分析後得知影響激博素生產之因子主效應有碳源濃度、氮源濃度及培養時間等，其餘因子對產物產量並無顯著之影響。再將碳源濃度、氮源濃度及培養時間等因子提高水準範圍配置於第二次直交表，得知 G. fujikuroi CCRC 32513 於 40 g/L 蔗糖、12 g/L 蛋白?活B培養 4 天後所得激博素產量較 60 g/L 蔗糖、18 g/L 蛋白?活B培養 8 天之結果為高。最後再將上述因子朝向低水準方向配置於第三次直交表後得知，生產激博素之最適碳、氮源濃度範圍分別為30 至 40 g/L、9 至 12 g/L、培養時間為 4 天，其餘因子為一次一因子所得之最適化條件，經此組合試驗可得一較高產量為 348 mg/L，且因子主效應及其交互作用對產量有著顯著之影響。

關鍵詞 : 絲狀真菌 ; 激博素 ; 直交表設計

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