

สารสีแดงผลิตโดย *ZYMOMONAS MOBILIS* CM 141

นางพิสมัย ทิพย์ธนทรัพย์



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรดุษฎีบัณฑิต

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**RED PIGMENTS PRODUCED BY
ZYMOMONAS MOBILIS CM 141**

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พิมพ์ต้นฉบับบทคัดย่อวิทยานิพนธ์ภายในกรอบสี่เหลี่ยมนี้เพียงแผ่นเดียว

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Zymomonas mobilis เป็นจุลชีพที่ใช้แทนยีสต์ในอุตสาหกรรมการผลิตเอทานอล มีการทดลองกลายพันธุ์เพื่อให้ได้พันธุ์ที่มีประสิทธิภาพดี *Zymomonas mobilis* CM 141 ที่ถูกชักนำให้เป็นพันธุ์กลายโดย สารเคมีไฮดรอกซีลามีน มีการผลิตสารสีแดงด้วย

เมื่อทำการแยกสารสีแดง ทำให้บริสุทธิ์โดยกระบวนการโครมาโทกราฟี และตรวจสอบคุณสมบัติโดยวิธีการสเปกโทรสโกปี พบว่าสารสีแดงนี้ คือ prodigiosin ซึ่งพบทั้งรูปอิสระและรูปมีอนุภาคบวก รูปอิสระจะอยู่ในสารละลายเป็น 3 รูป (tautomers) และไม่คงตัว จะเปลี่ยนแปลงเป็นรูปมีอนุภาคบวกได้ง่าย เมื่อมีน้ำเพียงเล็กน้อย ดังนั้นน้ำในตัวทำละลาย หรือสารดูดซับ หรือความชื้นในอากาศ จะมีผลต่อการเปลี่ยนแปลงเป็นรูปมีอนุภาคบวก การทดลองนี้ได้แสดงการเปลี่ยนแปลงที่เกิดขึ้นนี้โดย โปรตอนนิวเคลียร์แมกเนติกเรโซแนนซ์สเปกตรัม และพบว่าอนุภาคบวกจากน้ำจะเข้าที่ตำแหน่ง -1 ในโมเลกุล

การทดลองกลายพันธุ์ *Zymomonas mobilis* CM 141 โดยใช้แสงอัลตราไวโอเล็ต และสารเคมี (ไฮดรอกซีลามีน และเอ็น-เมธิล-เอ็น-ไนโตร-เอ็นไนโตรโซกัวนิติน) จาก 200 สายพันธุ์ พบว่าสายพันธุ์ A₁₁₃ ซึ่งกลายพันธุ์โดยไฮดรอกซีลามีน จะให้สารสีแดงมากกว่าสายพันธุ์พ่อแม่เกือบสองเท่า

การทดลองนี้ทำให้ได้ทราบข้อมูลของสารสีแดงที่ผลิตโดย *Zymomonas mobilis* ซึ่งไม่เคยมีรายงานการพบมาก่อน และการพัฒนาการกลายพันธุ์ให้มีการผลิตสารสีแดงสูงขึ้น จะได้แหล่งในการผลิต prodigiosin เพิ่มขึ้น

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

ภาควิชา
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ปีการศึกษา 2538

ลายมือชื่อผู้ผลิต
ลายมือชื่ออาจารย์ที่ปรึกษา
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PISAMAI TIPTANASUP : RED PIGMENTS PRODUCED BY *ZYMOMONAS MOBILIS* CM 141. THESIS

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Zymomonas mobilis was an anaerobic Gram-negative and fermentative bacteria used for replacing yeast in the industrial ethanol industry. *Zymomonas mobilis* CM 141 was induced by hydroxylamine to produce no levan and found to produce red pigments under aerobic conditions. The information of the red pigments produced from *Zymomonas mobilis* was not reported before. This experiment was performed.

The red pigments were separated, purified and identified as prodigiosin by spectroscopic methods. The free form showed the mixture of three tautomers. It was spontaneously transformed to hydrated form by the interaction with water in the solvent or adsorbent or moisture in the air.

The two forms of prodigiosin in solution were reported before which referred to the interaction of the base form with some acid in the solvent or adsorbent or moisture and carbon dioxide by spectrophotometric datas. This investigation was presented the spontaneously transformation of free form to protonated form by the proton nuclear magnetic resonance spectrometry and showed that the protonation was occurred by hydration at 1- position.

The mutation experiment was performed to increase the pigments production. The parent strains were treated with ultraviolet light and chemicals (hydroxylamine and N-methyl-N-nitro-N-nitrosoguanidine) at various times. By positive selection from 200 isolates, strain A₁₁₃ which treated by hydroxylamine for 20 minutes produced the red pigments about two times more than the *Zymomonas mobilis* CM 141.

This work was reported the informations of red pigments produced by *Zymomonas mobilis* CM 141 that never been found before. Mutation and selection experiments were used to development of better red pigments producing strains which expected to be the source of prodigiosin production.

ภาควิชา.....

สาขาวิชา.....

ปีการศึกษา.....

ลายมือชื่อนิสิต.....

ลายมือชื่ออาจารย์ที่ปรึกษา.....

ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....



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จุฬาลงกรณ์มหาวิทยาลัย
คณะเภสัชศาสตร์



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