# เอกสารอ้างอิง


บุญยืน ลำริกะภูติ. โปรตีน เชียงใหม่ ภาควิชาชีวเคมี มหาวิทยาลัยเชียงใหม่, 2522

วิรัช ค่ควงค้ภักดี. "การใช้เมล็ดถั่วเหลืองในอุตสาหกรรมน้ำมันพืช" ถั่วเหลือง 2520 : 258 - 261.

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## ภาคผนวก

### วิธีวิเคราะห์ความแตกต่างระหว่างค่าเฉลี่ยของตัวอย่างที่มีขนาดเล็ก

เพื่อทดสอบผลต่างระหว่างค่าเฉลี่ยของตัวอย่างขนาดเล็กทั้งสองซึ่งเป็นไปตามกฎของ Student - T distribution ซึ่งมีสูตรดังนี้คือ

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

เพื่อแสดงกระบวนการนี้ สมมติว่าต้องการศึกษาความแตกต่างของแอคติวิตี้จำเพาะการรีดิวซ์อะเซทีลีนของคอนจูแกนท์ ($R_1$) และไรโซเบียม ลาโปนิคัม 122 ในสัปดาห์ที่ 5 ดังนี้ สุ่มตัวอย่างต้นถั่วเหลืองที่คลุกด้วยคอนจูแกนท์ 6 ต้น พบว่ามีค่าเฉลี่ยแอคติวิตี้จำเพาะการรีดิวซ์อะเซทีลีนเท่ากับ 4.22 ไมโครโมลต่อต้นต่อชั่วโมง ส่วนเบี่ยงเบนมาตรฐาน 0.99 ไมโครโมลต่อต้นต่อชั่วโมง ขณะเดียวกันสุ่มจากต้นที่คลุกด้วยไรโซเบียม ลาโปนิคัม 122 จำนวน 6 ต้น พบว่ามีค่าเฉลี่ยจำเพาะการรีดิวซ์อะเซทีลีนเท่ากับ 2.93 ไมโครโมลต่อต้นต่อชั่วโมง ส่วนเบี่ยงเบนมาตรฐาน 0.51 ไมโครโมลต่อต้นต่อชั่วโมง

แทนค่า $n_1 = 6, \quad \bar{x}_1 = 4.22, \quad s_1 = 0.99$

$n_2 = 6, \quad \bar{x}_2 = 2.93, \quad s_2 = 0.51$

แทนค่าในสูตร

$$t = \frac{4.22 - 2.93}{\sqrt{\frac{5(0.99)^2 + 5(0.51)^2}{10}\left(\frac{1}{6} + \frac{1}{6}\right)}}$$

$$= 2.81$$

เนื่องจาก degree of freedom เท่ากับ $n_1 + n_2 - 2 = 10$ เมื่อเปิดจากตารางที่ระดับความเชื่อมั่น 95 เปอร์เซนต์ มีค่าเท่ากับ 2.23

การแปรผล

1. ถ้า t-value ที่คำนวณได้มีค่ามากกว่าที่เปิดจาก t-table แสดงว่าข้อมูลที่ทดสอบนั้นมีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ
2. ถ้า t-value ที่คำนวณได้มีค่าน้อยกว่าที่เปิดจาก t-table แสดงว่าข้อมูลที่ทดสอบนั้นไม่มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ


ประวัติผู้เขียน

นายอธิป ลิขิตลิลิต เกิดวันที่ 10 กรกฎาคม พ.ศ. 2498 ได้รับปริญญาวิทยาศาสตรบัณฑิต (ชีววิทยา) จากมหาวิทยาลัยรามคำแหง เมื่อปี พ.ศ. 2520