

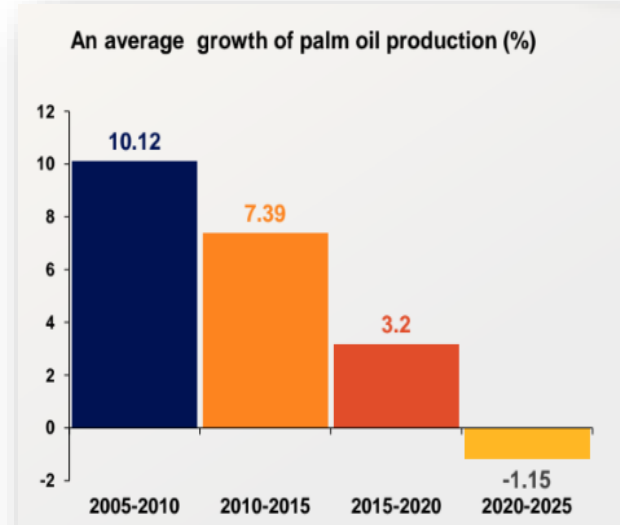
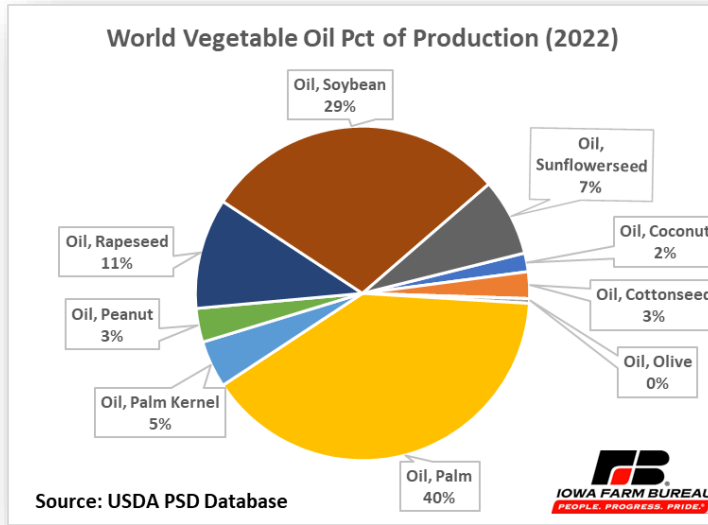


Enhancement of Oil Palm Plantation Growth through the Utilization of Lipo-chitooligosaccharides (1st Year)

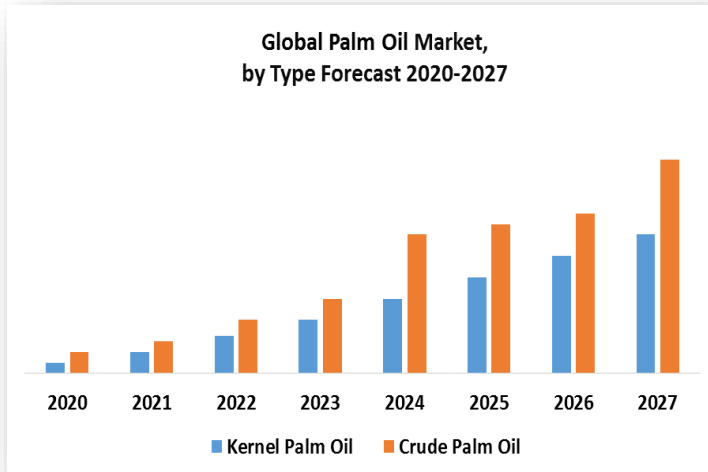
Project Team:
Ade Danova, Ph.D.
Dr. Elvira Hermawati

**Department of Chemistry, Faculty of Mathematics and Natural Sciences
Institut Teknologi Bandung
2025**

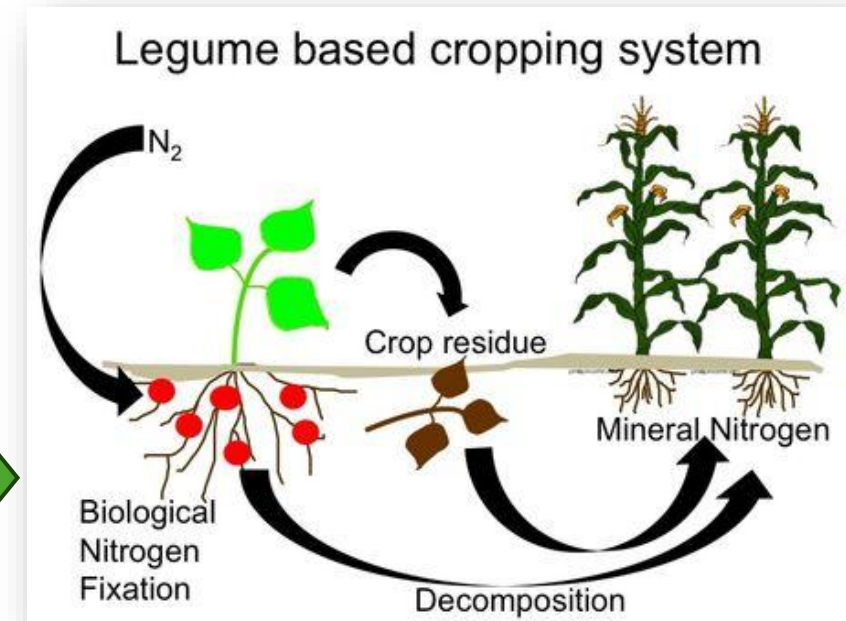
Introduction



The average growth of palm oil production during 2005-2025. (Gapki)

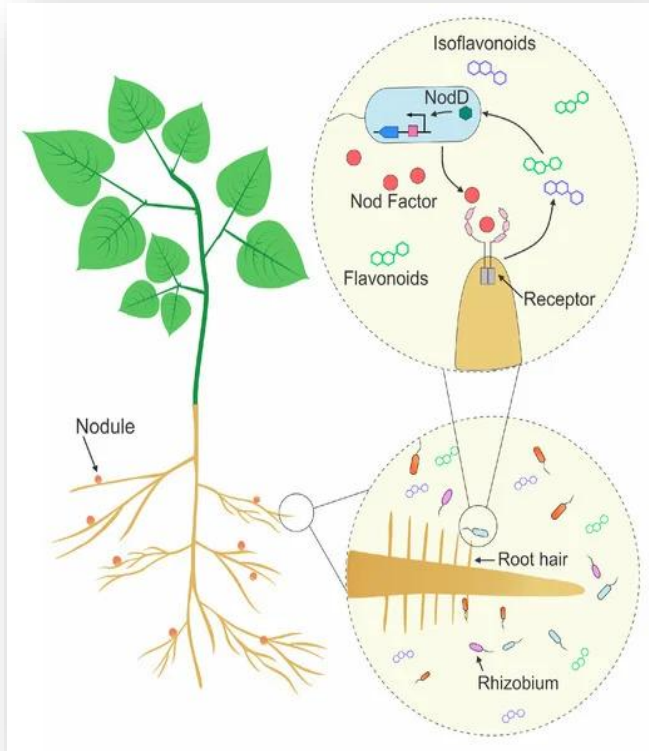


<https://doi.org/10.3390/ijms20215353>



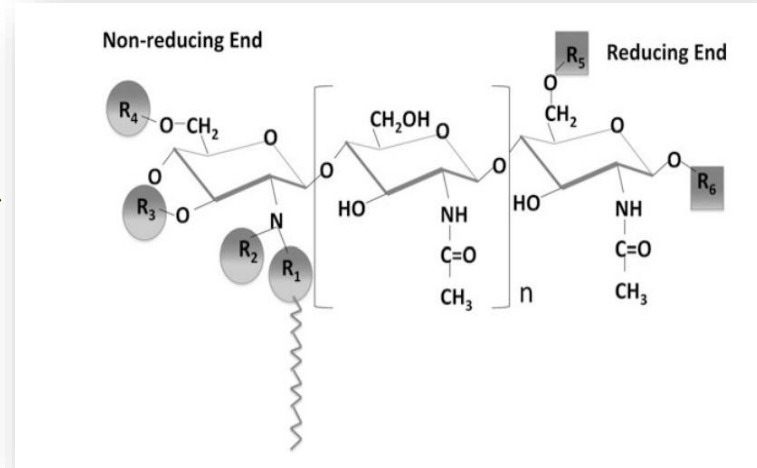
The decrease of palm oil production is caused by nutrient deficiency of palm oil plantation like nitrogen

Introduction



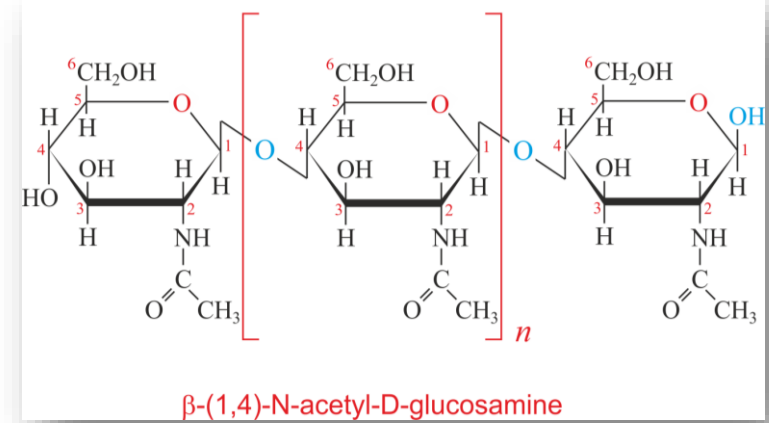
<https://doi.org/10.3390/genes9030125>

Nod Factors (lipo-chitooligosaccharides)

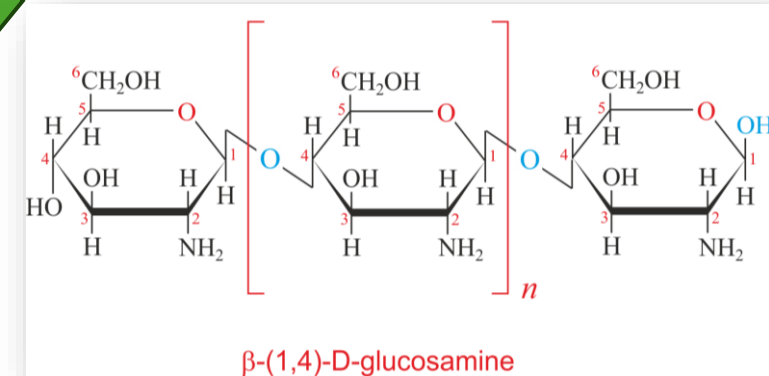


Ref: Kassaw, Tessema & Frugoli, Julia. (2013). Journey to Nodule Formation: From Molecular Dialogue to Nitrogen Fixation. 10.1007/978-3-642-39317-4.

Chitin



Chitosan



Abundant Polysaccharide

Nod factors are molecules secreted by nitrogen-fixing rhizobia and are recognized by legumes as a message to "let's live together/symbiosis." If the rhizobia do not produce nod factors, or if the legume has a **genetic mutation** that means it cannot receive the message, **nodules will not form**. Nod factors have recently been shown to also enhance the germination, growth and yield of legumes and non-legumes through processes other than nodulation. Thus, **Nod factors are very important for nitrogen-fixing to help the plants grow in soil that does not have much nitrogen by converting nitrogen from the air into a usable form**

Introduction

Objectives of the research



1st Year: Synthesis of lipo-chitooligosaccharides and its analogs derived from chitosan



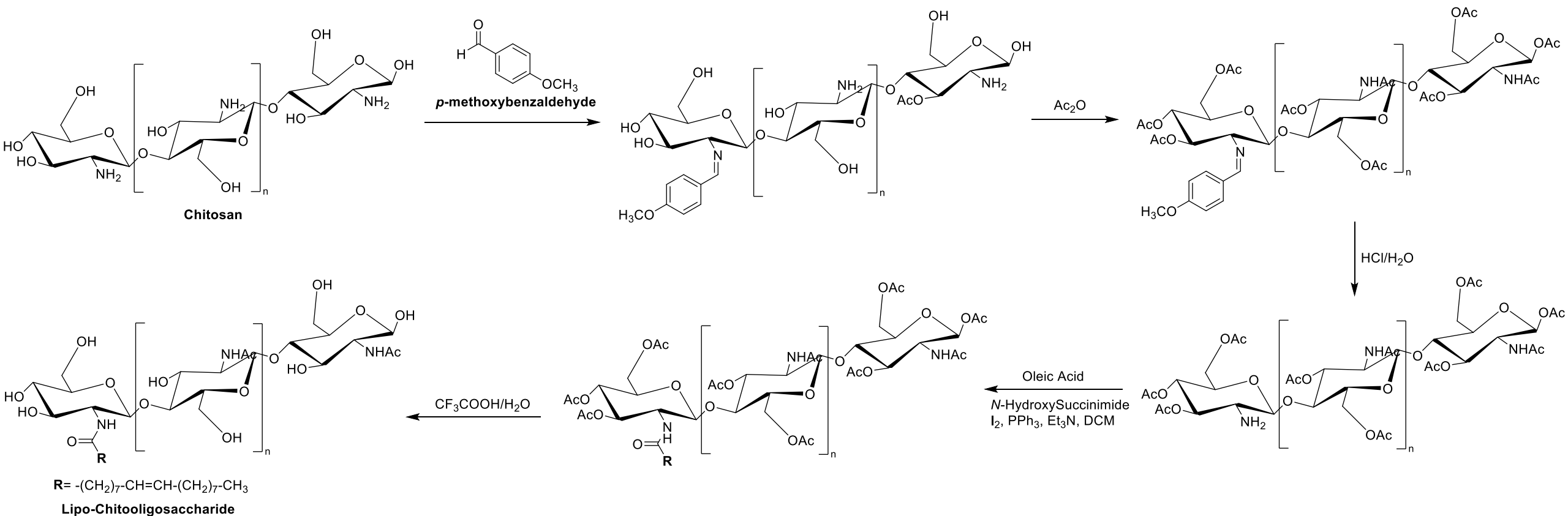
2nd Year: To determine the effect of lipo-chitooligosaccharides synthetic for palm oil plantation



3rd Year: To conduct the scale up production of lipo-chitooligosaccharides

Methodology

Synthesis of lipo-chitooligosaccharide and its analogs derived from chitosan



Methodology

Lab Equipments



NMR 400 MHz+NMR 500 MHz
Cryoprobe
NEW!!



UV Agilent Cary 60
new



SC-XRD Bruker D8 vent
NEW!!



LCMS-XEVO3 QTOF HRMS
new



CD Jasco J1500
(Organic+Biochemistry)

new

“Ilmu struktur”
(instrumen terbaik dikelasnya)



new



LCMS-Waters ESI-TOF HRMS

Methodology

Lab Equipments



Carousel 12 parallel Reaction



Evaporator



Reactor



Kromatotron

“Sintesis Kimia Organik” “Kromatografi”



Carousel 6 parallel Reaction



Electrasyn



1

Budgeting Plan-1st Year

No	Items	Cost
1	Chitosan	15.000.000
2	Acetic Anhydride	5.500.000
3	Trifluoroacetic acid	15.000.000
4	<i>p</i> -Anisaldehyde	6.500.000
5	Organic Solvent	150.000.000
6	<i>N</i> -Hydroxysuccinimide	15.000.000
7	Iodine	10.000.000
8	Silica Gel 60 F254 25 TLC Aluminium Sheet	15.000.000
10	Silica Gel 60 G for Thin-Layer Chromatography 1.007731.1000	15.000.000
11	Silica Gel 60 PF254 Containing Gypsum F 1.07749.1000	16.000.000
12	Triphenylphosphine	10.000.000
13	Research assistant	27.000.000
Total		300.000.000

Research Impact

