

植物による有用物質生産技術に関するエンジニアリング観点の基礎検討及び特性理解

(千代田化工建設株式会社¹) 松嶋 全人¹・○平林 翼¹・三枝 瑞季¹・村松 弘樹¹ 吉田 翔¹・西田 尚子¹

Fundamental investigation and understanding of characteristics from engineering aspects relating to the production of valuable material through plants (¹*Bio & Pharm Technology Development Section, Technology Development Department, Frontier Business Division, Chiyoda Corporation*) Akito Matsushima¹, ○Tsubasa Hirabayashi¹, Mizuki Saegusa¹, Hiroki Muramatsu¹, Sho Yoshida¹, Naoko Nishida¹

With the ongoing advancements in research and development for the production of valuable compounds from plants, there is still a lack of practical demonstration of such production. The implementation of engineering technologies aimed at commercialization is needed, yet there are few reports that systematically organize the production techniques for valuable compounds from plants, taking into consideration an engineering perspective. Especially in plant cultivation, which is a crucial step in production, it remains a personalized process and poses a hurdle for industrialization.

The process of compound production through plants can be divided into two processes: the upstream process, which involves cultivation and recombination, mainly relying on biotechnological approaches such as plants and microorganisms, and the downstream process, which involves extraction and purification and relies on chemical and industrial processes. The scientific fields to be considered for evaluation are diverse.

Through extensive study in our lab, we have identified and attempted to understand the challenges in plant production techniques. In this presentation, we aim to discuss the challenges and characteristics of compound production through plants, with the hope of contributing to the future development of plant-based compound production.

Keywords : hydroponic culture, recombinant, plant made pharmaceuticals, secondary metabolism, purification

植物の有用物質生産に関する研究開発が進む中、その生産実証は未だ少ない。商用化を目指したエンジニアリング技術の社会実装が求められる中、植物の有用物質の生産技術を整理した報告は少なく、エンジニアリング観点を持った一連の生産技術を俯瞰し議論した場は存在しなかった。特に、植物栽培は生産に重要な工程であるが、属人的な工程であり、工業化へのハードルとなる。

植物による物質生産工程は、栽培や遺伝子組換えから成る上流工程と、抽出・精製を成す下流工程に二分できるが、上流は植物や微生物等のバイオが主となる技術構成で、下流は化学・工業を主とした技術構成となり、検討する科学分野が多岐に渡る。

我々はラボでの検討を重ね、植物の生産技術の課題を抽出し、理解を試みた。本発表では、植物による物質生産の課題及びその特性を議論する事により、植物の物質生産の発展と今後に寄与することを期待する。