# The Basics of Plant Biologics

zea
Biosciences

## Introduction

Plant-based medicine is nothing new. Humans have been using plants to heal diseases for billions of years. But today, as the cost of synthetic pharmaceuticals continues to rise, researchers are turning their attention to plant biologics.

## What are Plant Biologics?

A biologic is typically a genetically engineered protein that is manufactured inside a living system, such as a plant. Biologics are products of recombinant DNA technology, where DNA molecules from different organisms are joined and inserted into a host organism to produce new proteins that are of value to science, medicine, agriculture, and industry.

## History of Plant Medicine

According to the Journal of American Medicine, humans have been using plants for healing since the Neanderthal period—and perhaps even earlier.

## Nutraceuticals and Herbal Supplements

But it wasn't until the late 20th century that plant-based nutraceuticals and supplements became popular because of their reputation for helping people with nutrition, sleep, and even hair and skin care. Today, approximately 60% of the world's population use nutraceuticals and herbal medicines. This market is expected to exceed $1 trillion dollars globally and grow by more than 17% in the next five years.

## Most Efficient Protein Producers on the Planet

Research shows that plants are the most efficient protein producers on the planet, stemming from the fact that the food chain of life starts with plant matter. The protein machinery that is part of the plant's physiology can be used to make new medicinal plant products.

## Animals vs. Plants

Today, most modern biologic drugs are made from genetically engineered animal cells. However, the "limited scalability and high cost prevent this platform from meeting the ever-increasing global demand."

Plant biologics, on the other hand, are less expensive to produce than those derived from animal cells. But plants grown outside, in greenhouses or other types of indoor farming environments have still seen high degrees of variability.

For plant biologics to be approved as a pharmaceutical product, the product must be able to be scaled with minimum variability between plants. Standard growing practices do not allow for this minimum variability and therefore a new growing platform is needed.

## New Technology, New Benefits

Recent innovations in technology have developed the ability to offer medicinal plant products that are consistent and scalable. The technology has also improved protein purification techniques. "Transient protein expression in plants has evolved into a technology that offers a unique combination of rapid expression... speed of scalability and relatively low capital costs, highlight the great potential of this technology in the future of human and animal health."

## Accessible to the World's Population

Another benefit of plant biologics is that they can become more readily available to developing countries, because they are less expensive than synthetic medicines, and are easier to scale, store and distribute.

## The Next Generation of Medicine

Experts say that plant-based biologic technology will likely be the next major commercial development in the field of biotechnology. In fact, the National Institutes of Health (NIH) states that "plants ... offer the traditional advantages of proper eukaryotic protein modification, potential low cost, high scalability, and increased safety but also allow the production of biologics at unprecedented speed to control potential pandemics."


## From R&D to Production

While plants have been used as medicine for more than 5,000 years, innovative technology now can minimize plant variables and maximize plant expression, resulting in a consistent and scalable medicinal plant product. ZEA Biosciences CleanGrow Technology (CGT) ™ Platform optimizes plant growth for our researcher, nutraceutical and pharmaceutical customers. This cutting-edge technology establishes a clear path to predictability, ensuring that plant number one is the same as plant one million.

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## Want to know more about ZEA's CleanGrow Technology™ Platform? Contact us!

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