

# Up-cycling of by-products advances in the biotechnological synthesis of bioactive molecules.

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## Introduction

The existence of the human race depends on bioactive substances originating from microbial and plant sources, hence groundbreaking study in this area is necessary. The primary sources of naturally occurring bioactive chemicals for many biotechnological applications are plants and microorganisms. Since then, man has been given a lead to the invention of effective pharmaceuticals that treat both human and plant illnesses thanks to recent advancements in the fields of bioactive chemicals and soil chemistry in agriculture [1]. The soil serves as the growing medium for medicinal plants, but its deterioration has a significant impact on the quality of medicines, food crops, and other crucial components found in plants that strengthen the body. Scientists and the pharmaceutical industry have focused their attention on this area in an effort to create stronger medications from medicinal plants cultivated in various types of soil. A measure of the quality dependence of the soil producing secondary metabolites and soil containing microbes has been provided by studies of the effect of various parameters and the qualities of soil, such as; effect of heavy metals, pH, soil organic matter, and phytoremediation process. The knowledge offered will be helpful in figuring out how microorganisms behave and how they interact with soil and all real drug-producing plants. In this overview, a few active chemicals found in plants and microorganisms, along with their characteristics and uses, have been discussed. The activities and interactions of soil microbes, the effects of soil particle size, the dispensability and stability of soil microbes, and the prospects for the future production of novel active substances have all been described [2].

## Applications and Characteristics of Active Molecules

Natural substances produced from plants and microorganisms have long been known, and they continue to hold great promise for medication research and discovery. The many components of various plant species have shown to be crucial sources of new medications for the treatment of bacterial and fungal infections, cancer, heart disease, malaria, and other illnesses [3]. Over the years, studies on the phytochemistry of plants have revealed that medicinal plants contain flavonoids, alkaloids, tannins, saponins, and glycosides. For the benefit of both plants and people as a whole, they make up the majority of the active compounds found in plants. These

phytochemicals, especially in high concentrations, can shield plants from hyperaccumulation and harm from free radicals. As a result, the plant will be able to create a wide range of varied bioactive substances that can be used to treat hazardous diseases. Positive phytochemical-containing plants are a rich source of antioxidants, adding value to humankind's overall health and well-being. Numerous biological and physiological processes are also carried out by phytochemicals, which are abundantly present in a variety of plant species [4].

Some antibiotics made from medicinal plants have a number of unfavourable side effects that restrict their use. Currently, the majority of the microorganisms responsible for diarrhoea, cutaneous and urinary infections, as well as various respiratory disorders, are developing resistance. The widespread use of antimicrobial medications to treat illnesses is mostly to blame for this. In order to create novel antimicrobial drugs that are effective and have fewer side effects, it is essential to understand how microbes work. In addition to treating malignant cells, ulcers, swellings, eczema, tumours, and high blood pressure, chemical compounds derived from plant species' extracts are used to treat chickenpox, measles, asthma, ulcers, swellings, and tumours. They are also used to treat malaria, rheumatism, tetanus, and fevers. In addition to verbascoside, which combines antibacterial and anticancer properties, other plant extracts of therapeutic significance also have insecticidal and nematocidal action. There is a brief discussion of several elements that affect medicinal plants, microbial activity in the soil, cultural practises, and diverse effects on microbial biomass. These considerations include the impact of nanoparticles, heavy metals, soil organic matter, and pH [5].

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