Editorial

Pharmaceutical BIOPROCESSING

Dynamics and scale up of the Pharmaceutical molecule

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The use of biopharmaceuticals dates from the 19th century and within 5–10 years, up to 50% of all drugs in development will be biopharmaceuticals. In the 1980s, the biopharmaceutical industry experienced a significant growth in the production and approval of recombinant proteins such as interferon's (IFN α, β, and γ) and growth hormones. The production of biopharmaceuticals, known as bioprocess, involves a wide range of techniques. In this review, we discuss the technology involved in the bioprocess and describe the available strategies and main advances in microbial fermentation and purification process to obtain biopharmaceuticals. The great diversity of molecules produced by filamentous fungi justifies the exploitation of these organisms. In particular, the isolation and identification of taxol-producing endophytic fungi is a new and feasible approach to the production of this antineoplastic drug. The development and use of taxol-producing fungi have made significant progress worldwide. Taxol was produced by *Fusariumoxysporum* grown in potato dextrose broth. In addition, the filamentous fungus *Aspergillusniger* isolated from Taxus cuspidate was found to produce taxol.

Over the past centuries, there has been a notable increase in the application of enzymes in various sectors of industry. This is because the enzymes could be used as a substitute for some toxic chemicals that were previously involved in food processing. On the other hand, the biotechnological approaches involving the identification of microbial enzymes, mechanisms of action, and scaled-up production are a critical challenge to the researchers. Biopharmaceuticals are revolutionary in the pharmaceutical industry. According to global revenues, 10 biotechnological related products figured among the top-25 best-selling drugs in 2015; 4 of them produced by microorganisms. These biopharmaceuticals are marketed by leading pharmaceutical companies primarily located in U.S.A, Japan, and Europe and comprise a narrow scope of treatment profile, with most drugs for the treatment and management of inflammatory diseases (e.g. rheumatoid arthritis) and cancer.

There have been number of microbe-borne enzymes (amylase, cellulase, glucosidases, invertase, keratinases, lactase, ligninase, lipase, penicillinase, protease, xylanase, etc.) developed and commercially popularized due to their highly significant action as well as economic feasibility. The enzyme pectinase has engrossed interest worldwide as a biological catalyst in various industrial processes. This enzyme breaks down pectin commonly found in the plant cell wall and, hence, is well-known for the commercial preparation of clear fruit juice, liquefaction and saccharification of plant biomass, paper making, as well as coffee and tea fermentation. The review also presents an overall idea about the different production methods of pectinase and pharmaceutical applications of both pectin and pectinolytic enzyme.

Essential oils from medicinal plants nowadays are widely adopted in both developed and developing countries due to their valuable medicinal properties against the treatment of different diseases including microbial infectious ailments, depression, anxiety, cancer, and wound healing with no or less side effects. Further, they are contributing a maximum role in cosmetics and perfume industries.

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Advances in genetic engineering have, over the past two decades, generated a wealth of novel molecules that have redefined the role of microbes, and other systems, in solving environmental, pharmaceutical, industrial and agricultural problems. New technological advancements are continuously made to improve the discovery, rational modification, production, and purification of biopharmaceuticals. Innovative strategies to identify different species of microorganisms from the Brazilian biodiversity must be investigated targeting the discovery of alternative hosts for heterologous expression.