UDC 577.2:631.8

Biotech Plants for Bioremediation

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Purpose. On the basis of a comprehensive study of the conventional remedial strategies (physical and chemical) of the contaminants, it has been reported that physical and chemical remediation are very expensive, disruptive to the environment, may temporarily increase exposure to chemicals, and often leave residual or left out contamination. Broadly it does not eliminate the problem, rather merely shift it. In addition, phytoremediation has been proposed as a cheap, sustainable, effective, and environmentally friendly over conventional remediation technologies. Plants use solar energy to extract chemicals from the soil and water to deposit them in their biomass, or to convert them to a less toxic form. These plants later can be harvested and treated, removing the pollutants. However, several species can tolerate and grow slowly in the specific contaminated sites and produce very low biomass. It can be overcome by introducing the novel traits for the uptake and accumulation of pollutants into plant's biomass through the genetic manipulation and plant transformation technologies. **Method.** This manuscript critically reviews the some of the prominent research efforts to address the challenges and highlights the finding. **Results.** An engineered plant shrub tobacco (*Nicotiana glauca*) transformed with the phytochelatin TaPCS1 shows very high levels of accumulation of zinc, lead, cadmium, nickel, and boron, and produces high biomass. Similarly Arabidopsis, Indian mustard, and tobacco plants improved the metal tolerance by the over-expression of enzymes that induce the formation of phytochelatins. **Conclusions.** Although the biotech plants with improved potential for efficient, clean, cheap, and sustainable bioremediation technologies is very promising, several challenges are remained to analysis and discover the genes suitable for broader subset of pollutants.

Keywords: *Conventional remedial strategies; Phytoremediation, Engineered plant; Shrub tobacco; High metal accumulation and biomass.*

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UDC 519.72:631

Integration of digital technology and agriculture the present and future

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Purpose Till date, agriculture has been greatly confined to the ardent effort of farmers and employment of the conventional equipment of routine technologies. Limited research has gone into the purpose of integrating other revolutionary technologies with agriculture because of these restraints. From Artificial Intelligence to Robotics, the heterogeneity of the development of the Digital World has been exponentially surging, and its incorporation into the field of agriculture could benefit mankind substantially. **Methods** This paper is dedicated to surveying the present implications of the digital technologies in agriculture and familiarising its various existing applications in the field. The merits and challenges of this endeavour along with emphasis on the future perspectives are also discussed. **Results.** The ventures to bridge the gap between the production process and consumerism using digital technologies has been undertaken by many developed countries but still remain inaccessible or unimplementable to most developing countries. **Conclusions** The adoption of smart farming methods has been shown to improve the efficiency of the production process, promote equity between the different classes of workforce and increase the environment sustainability. The emerging new applications could transform the labour-intensive traditional agriculture to a highly automated data-based industry.

Keywords: *e-agriculture; Agriculture Digitalisation; Innovation; Agricultural research; Robotic farming; Precision Agriculture.*

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