Research in Medicinal Plants : a pivot to human health

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INTRODUCTION

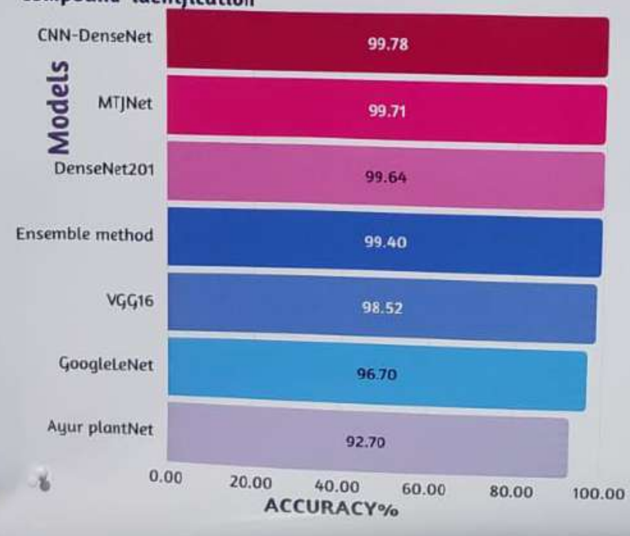
Medicinal plants contain biologically active compounds in one or more of its organs (such as leaves, roots, flowers, seeds, or bark) that can be used for therapeutic purposes or to promote health and well-being. Medicinal plants have long been integral to traditional and modern healthcare, providing a rich source of bioactive compounds with antimicrobial, anti-inflammatory, and neuroprotective properties. Advances in deep learning, genomics, and CRISPR/Cas technology and other research methodologies are revolutionizing plant classification, optimizing secondary metabolite production, and accelerating drug discovery. The objective of this review work is to gain deeper insights in the present research scenario in medicinal plants.

METHODOLOGY

Data related to advanced research techniques being used in identification of medicinal plants and in enhancing production of specialized secondary metabolites has been retrieved through literature survey using various search engines such as PubMed, Google scholar, Research Gate, etc. and compiled in order to gain insights on the current status and progress in medicinal plant research.

OUTCOME

Deep learning models for medicinal plant species and compound identfication



Various techniques and their applications in medicinal plant research

Techniques/ models	Subject plants	Application
CRISPR/Cas-Based Gene Editing	*Cannabis sativa*	Targeting THCA, CBDA, and CBGA to enhance cannabinoid production.
Virus-induced Gene Silencing (VIGS)	*Withania somnifera*	*WsPDS, WsFPPS, WsHMGR* can be transferred to their host *Withania somnifera L.* through the Tobacco rattle virus (TRV)
Genetic Transformation	*Atropa belladonna*	Improved alkaloid composition
Polyploidy Induction	*Pogostemon cablin*	Doubling chromosomes can result in larger and more valuable plant parts with medicinal and economic value
Nano particle mediated gene delivery	*Cannabis*	Genetic transformation of medicinal plants
Plant tissue culture • Clonal micro-propagation • Callus cultures • Protoplast and suspension cultures	• *Ocimum tenuiflorum* • *Crocus sativus* • *Zingiber officinale* • *Zea mays* • *Catharanthus roseus*	• Obtain large numbers of clonal plants in a short time. • Gingerol, shogaol, and zingerone from *Zingiber officinale*. • Crocin from *Crocus sativus*. • Eugenol and ursolic acid from *Ocimum tenuiflorum*. • Enhanced production of Benzoxazinoids from *Zea mays* and indole alkaloids from *Catharanthus roseus*.

CONCLUSION

The bibliometric study highlighted that there has been more research focused on exploring and identifying new drugs and specific active compounds from medicinal plants as compared to research on improving the cultivation strategies and domestication of plants which are known to possess immense medicinal values.

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OUTCOME
Deep learning models for medicinal plant species and compound identification
Models
ACCURACY%
99.73
99.71
99.64
99.40
98.52
90.70
92.31
Various techniques and their applicatio
Techniques/ models
Subject plants
CRISPR/Cas-Based Gene Editing
Cannabis sativa
Virus-Induced Gene Silencing (VIGS)
Withania somnifera
Genetic Transformation
Atropa belladonna
Polyploidy Induction
Pogostemon cablin
Nano particle mediated gene delivery
Cannabis
Plant tissue culture
• Clonal micro-propagation
• Callus cultures
• Protoplast and suspension cultures
CONCLUSION
The bibliometric study highli
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REFERENCES
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