Medicinal and aromatic plants: Healthcare and industrial applications – a book review

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Book Review

Medicinal and Aromatic Plants – Healthcare and Industrial Applications. Tariq Aftab and Khalid Rehman Hakeem (Eds). Springer Nature Switzerland AG 2021. eBook ISBN: 978-3-030-58975-2; doi: https://doi.org/10.1007/978-3-030-58975-2

As highlighted in Medicinal and Aromatic Plants – Healthcare and Industrial Applications, edited by Tariq Aftab and Khalid Rehman Hakeem (2021), this book presents the various applications of medicinal and aromatic plants in different sectors including healthcare, industry and pharmaceutical (Fig. 1). This compilation provides valuable insights for students and researchers who are working on medicinal and aromatic plants.

The subject matter of the book is extensive and applications of the discussed medicinal plants in the book are manifold. Although, many books have written on medicinal and aromatic plants, but this book is one of its kinds. A lot of efforts are required to keep a record and make it available to wider spectators. Similar efforts by Tariq Aftab and Khalid Rehman Hakeem have resulted in the publication of Medicinal and Aromatic Plants, the book under review.

A Preface by the authors shows efforts of the parent organization in bringing out the plant resources of the country from a new perspective. It is an exclusive reference book showcasing numerous industrial, healthcare and pharmaceutical applications that are now utilized significantly on medicinal and aromatic plants and its scenario in coming time also. Particularly, in the book, emphasis is put on the solutions of many health issues, industrial applications of medicinal plants and future perspectives of Medicinal and Aromatic Plants research. The book contains 30 chapters in which 92 figures, 51 tables and one flowchart are skillfully incorporated.

First chapter by B. Ahad et al. contains eight (08) figures and one (01) table. It gives the overview of therapeutic plants and medicines obtained from them. The curative capacity of therapeutic plants and after-effects of recent allopathic medicines is also mentioned. The significance and involvement of various families of plants along with their bioactive compounds is also revealed. Overview of medicinal plants is provided which may be helpful for further research in medicinal plants and production of new valuable remedies. Second chapter by D. Pandita and A. Pandita contains eight (08) figures and four (04) tables. Secondary metabolites are mentioned in a detailed manner in this chapter including their structure, plant sources, functions, health benefits and pharmacological properties. Due to the UV absorbing proficiency, secondary metabolites protect leaves and grasses from strong light. Secondary metabolites got the important position in the healthcare system and

can be utilized in the recent medicine research for fighting against terrible diseases like Cancer, Alzheimer, Parkinson and dreaded viruses.

Third chapter by A. Shafi et al. contains two (02) figures and in this chapter, the sustainable uses of herbal and fragrant plant assets are mentioned. Moreover, emphasis is given on the protection of MAPs. Fourth chapter by N. Kaur and T. Ahmed contains nine (09) figures and four (04) tables and explains the properties of secondary metabolites used for combating ailments. In this chapter, the chronology of significant events showcasing the past attainment of practice of medicinal and aromatic plants till the existing time and the pathways for the synthesis of secondary metabolites is also mentioned. The authors mentioned that many drugs are available for the cure of *Diabetes mellitus,* but they have numerous side effects, therefore scientists are constantly working for alternatives of these medicines. The authors also stated about the α-amylase inhibitor activity or α-glucosidase inhibitor activity of some antidiabetic plants such as *Aloe vera, Camellia sinensis, Euphorbia hirta, Ficus elastica, Terminalia arjuna* etc.

Fifth chapter by S. Choudhary et al. contains one (01) figure and one (01) table mentioning the potential uses of bioactive compounds of medicinal plants and their mode of action in several human diseases. Alkaloid bearing medicinal plants and their anti-cancerous, anti-malarial, anti-bacterial, antiviral and anti-hypertensive properties are also mentioned. The authors also stated that many secondary metabolites have not been tested for their probable applications till date. Sixth chapter by A. Roychoudhury and R. Bhowmik contains three (03) figures and one (01) table and mechanism behind the performance of bioactive compounds in therapeutic plants and benefits of herbal medicines are mentioned by the authors. Seventh chapter by S. Rana and S. Anjum contains six (06) figures. Vernacular names, morphological description & distribution, chemical constituents of many plants and their role in traditional medicine system and applications of medicinal plants in pharmaceutical industry are mentioned elegantly.

Eighth chapter by L. Tariq et al. contains three (03) tables and authors mentioned the bioactive phytochemicals of medicinal plants, pharmacological action and diseases cured from these plants. Toxicity of some plants is also mentioned and authors state that toxicological testing of herbal drugs may help in justifying their validity and health. Ninth chapter by A. Ramzan and R.U. Rehman contains one (01) figure and one (01) table. Estimation of active constituents occurring in the foliage of amaranthus and spinach are stated which shows that content of proteins, fats, carbohydrates, ascorbic acid, calcium and iron is more in amaranthus as compared to spinach. Importance of Amaranthus is highlighted by the authors and they also emphasized on conserving the germplasm of Amaranthus for sustainable development as it is considered amongst underutilized crops. Tenth chapter by J.A. Malik et al. contains two (02) figures and one (01) table. Antidiabetic activity of *Aloe vera* and *Momordica charantia* - the two significant therapeutic plants is mentioned in this chapter. Ten antidiabetic medicinal plant species are discussed in the table along with their hypoglycemic activity. Authors confirmed that alkaloids, flavonoids, glycosides, phenolic compounds etc. are the compounds which have the properties mainly used for curing diabetes.

Eleventh chapter by M. Hassan et al. contains one (01) figure and one (01) table. Traditional uses of *Abutilon theophrastii*, morphological description, growth and development, distribution, reproduction, phytochemistry and biological activities etc. are also mentioned. Twelfth chapter by M. Majeed and R.U. Rehman contains one (01) figure and one (01) table. The authors explained about *Viscum album* L. – a non-parasitic medicinal shrub growing on another plant. It is observed by the authors that branches and leaves of the plant have variation in the content of chemical compounds such as phenolics and flavonoids according to the kind of host plant on which it resides. Moreover, it is also mentioned that plant harvested in varied seasons shows different antioxidant activity in the plant tissue due to environmental factors which extensively influence the assemblage of antioxidant constituents. Anti-oxidant, anti- microbial, hypoglycemic, anti-inflammatory, immune-modulatory, anti-cancerous, anti-hypertensive activities of *Viscum album* are also mentioned.

Thirteenth chapter by M.H. Kahan et al. is about *Crocus sativus* L. (saffron), its genetic origin, botanical description, phytochemical components and ethnomedical importance. Procedure of action of *Crocus sativus* in avoidance of diseases varying from anti-cancerous to cognitive enhancer is discussed properly. Crocin and crocetin are the bioactive compounds present in saffron. Different activities of *Crocus sativus* such as pharmacological, biological and prophylactic are also mentioned in a proper manner. Chemopreventive role is discussed in an appropriate way and anti-tumor activity of saffron is also nicely presented in a tabular form. Fourteenth chapter by S. Chaturvedi et al. contains three (03) figures and four (04) tables. A thorough overview of red clover extract is specified; its pharmacological importance, signaling passageway transformed by BCA and FMN under diverse pathological states and pharmacokinetic interactions of both the isoflavones which consequently changed the bioacessibility of other medicines administered with it by the involvement of ABC

transporters. Fifteenth chapter by A.O. Adeoye et al. contains two (02) figures and one (01) table. It is an interesting chapter mentioning about the phytomoleculess with anti-obesity properties. Phytomolecules are the best alternative for treating obesity due to fewer side effects, easily available, economical and safe to consume.

Sixteenth chapter by B Malik and RU Rehman contains one figure and one table. It is about nutritional and therapeutic properties of chicory. Authors explained that chicory contains natural inulin which is a nutritional fiber with many health benefits. Several nutrient rich foods and beneficial products can be procured at commercial level from Chicory. Authors put emphasis on cultivation of high yielding varieties due to rising demand for the chicory inulin. Seventeenth chapter by SK. Chowdhury et al. contains four figures and six (tables. In this chapter, study of relationship between various kinds of natural compounds, its antifungal mechanism and antimicrobials from plant source are discussed. Eighteenth chapter by M. Mukarram et al. contains five figures and one table. This chapter discussed the potential of lemongrass oil for the production of environment responsive insecticides. Lemongrass is mostly grown for its essential oil, which is of much significance in industries, pharmacology, cosmetics etc. Constituents of essential oil have an extensive variety of biological activities. These components exhibit cytotoxic and neurotoxic response in different insects.

Nineteenth chapter by J.R. Al-Obaidi et al. is about medicinal & pharmaceutical significances, industrial and commercial uses, environmental impact of four significant plants i.e. *Simmondsia chinensis* (Jojoba), *Moringa oleifera*, *Aloe vera* and *Acacia*. These plants have multipurpose benefits and cultivated by people for many years. These plants are very profitable for the atmosphere in conditions of oxygen advancement and minimizing the carbon emission. Twentieth chapter by Kumar et al. contains two (02) figures and six (06) tables. Authors elaborated that phytoremediation by using medicinal and aromatic plants indicates cost effectiveness and eco-friendly strategies for sustainable development. Essential oil and medicinal products obtained from these plants will be of great importance for raising the economies of other countries also. Authors stated that further comprehensive research is required that combines biotechnological methods to improve plant biomass and the ability to hyperaccumulate toxic metals in plants. Further studies may fully harness the phytoremediation capabilities of aromatic and medicinal plants.

Twenty first chapter by M.S. Wani et al. contains three tables. In today's world, phytoremediation provides a solution to one of the most serious problems of pollution confronting humanity. Phytoremediation not only addresses the pollution issue but also provides numerous ecosystem advantages, making it a viable and feasible solution. Specifically, the incorporation of MAPs along with tree species is able to foster the whole growth of environment and its inhabitants. Given its economic viability, this approach can be promoted for widespread adoption in the cleanup of contaminated areas. A diverse array of pollutants can be addressed by plants in a cost-effective manner, which is quite impressive and interesting. Enhancements through technological and biological means can be implemented to boost the effectiveness of plants in addressing pollution issues. Twenty second chapter by Sahil et al. contains one (01) flowchart, one (01) table and three (03) figures. The broad identification of herbal medicines and their economic importance helped in recognizing their role and benefits for humankind across the globe. Due to the occurrence of a variety of impurities in medicinal plants and their goods, it is essential to evaluate these contaminants for appropriate use. Microbial contaminants can easily accumulate in the plants or their products during preparation processes. Additionally, toxic elements can be absorbed by plants from the soil they grow in or from the water used for irrigation. There can be numerous harmful contaminants present in the plants that pose risks to human consumption. Therefore, thorough assessment and removal of these contaminants is required.

Twenty third chapter by A. Roychoudhury and R. Bhowmik contains five (0 figures and two tables. Utilization of allopathic medication seems to have adverse effects on the well-being of populace worldwide within future. Use of enormous natural assets of herbal medicinal remedies shows a great potential to the solution of this problem; but this requires increasing the output of species of wild plants by using modern techniques such as metabolic engineering, gene restriction, bioreactors etc. to fulfill the demand and also to check the disappearance of precious herbaceous plants. Twenty fourth chapter by Monika Bansal and Shabir H. Wani discussed the combined structure of advancement in biology by using proteomics metabolomics, transcriptomics, genomic studies in MAPs which assists for forecasting functions of genetic material concerned in biosynthetic way of the compounds which construct the bioactive constituents of these plants. Authors mentioned that original biomarkers can be created with this collective approach, and it will be possible to alter the structure and function of regulatory molecules involved in the biosynthesis of desired metabolites by using the tools of genetic engineering.

Twenty fifth chapter by SA. Khan et al. contains eight figures and four tables. The authors stated that the impact of more studies on manufactured seed is much significant if standard procedure can be set up for revival of plants from artificial seeds directly in the contaminated conditions. However, protocol of artificial seed method comes across with many difficulties.

Main problem is the germination percentage of these seeds which is very low when these seeds are transferred to soil. Moreover, shifting of synseed mediated plants to green house is also unimaginative. *Acorus calamus* (Bach), *Bacopa monneiri* (Brahmi), *Hypericum perforatum* (St. John's wort) and *Stevia rebaudiana* are exploited for producing artificial seeds and have revealed the rising proportion of greenhouse adaptation. Furthermore, procedure and practices mentioned in this section may be significantly used for further therapeutic plants also.

Twenty sixth chapter by HJ. Barrales Cureno et al. contains ten figures. In this chapter, it is stated by the authors that huge number of extracts of medicinal and aromatic plants with increased prospective necessitate conducting tests to acquire and produce fragrances of fresh aromas. True secondary metabolites permit to get aromas which are nontoxic. Yielding MAPs is a feasible substitute in few types of vicinity but requirement for a particular specialized area cannot be overlooked because the demands for yield and excellence of these crops is rising these days as organic or biological production is preferred to gain satisfactorily prices in this fragrance trade.

Twenty seventh chapter by NA. Wani et al. contains three tables. Authors discussed about the importance of biodiversity due to which continued existence of human and vigorous activities of natural existence is possible even if biodiversity is insufficient because of anthropological pressures of human beings. It is highly essential to conserve biodiversity by different protection strategies. Maximum people depend on biodiversity in one way or another for their sustenance. Therefore, awareness should be created for conserving biodiversity and old natural resources. Twenty eighth chapter by T.A. Mir et al. contains two (02) figures. Authors highlighted the importance of medicinal plants which are also very important component of the biological world and build the strength of wellbeing of population and economy of the Nation. Maximum people are dependent upon medicinal plants or herbal medicines for their primary healthcare. Moreover, pharmaceutical industries are also taking advantage of these resources. Due to the overexploitation of medicinal plants, these are under serious threat of extinction. Therefore, it is highly required to preserve these assets for saving the precious inheritance.

Twenty ninth chapter by IA. Lone and M. Gaffar is concerned about the decrease in agriculture produce due to rise in heavy metal contamination occurring due to expansion of anthropogenic activities which distresses the individual and plant wellbeing. But phytoremediation processes are very helpful at polluted sites as medicinal and aromatic plants take away this contamination by way of phytoremediation or by acting as phytostabilizers, hyperaccumulators, biomonitors and facultative metallophytes. Thirtieth chapter by P. Mukherjee and S. Mukherjee contains five (05) figures and one (01) table. Authors stated that exploring the depositories of indigenous wild plant species in various parts of the country is essentially required for sustainable development and environment management. Lawful security of therapeutic plants and IPR is also discussed. Case studies of traditional medicines are revealed properly. Appropriate market worth and efficient financial system derived from the trade of essential oil should be sustained to compete with other synthetic fragrant compounds.

Main issue which we want to highlight is that in table 1.1, a number of therapeutic plants, families, plant part utilized and uses were mentioned but if the dosage and mode of administration was also mentioned it would have been much better for the readers to use the plant in a proper way. Another concern is that in fig. 5.1, images of plants are not very clear. Moreover, in fig. 12.1 title of the image i.e. *Viscum album* growing on *Jugulans regia* has the wrong spellings of *Juglans regia*, which should be corrected. Furthermore, in figure 13.1 c, d – images of saffron flower are also not clear and in fig. 22.1, botanical names should be in italics.

Remarkably, tables and figures are the attractions of this book. Structures of chemical compounds are very beautifully represented. I have great pleasure and pride in strongly recommending this book to all medicinal plant lovers across the world. This treasure trove is much more valuable than the price fixed for it – my hearty congratulations to editors, authors, designers, photographers and printers.

Literature cited

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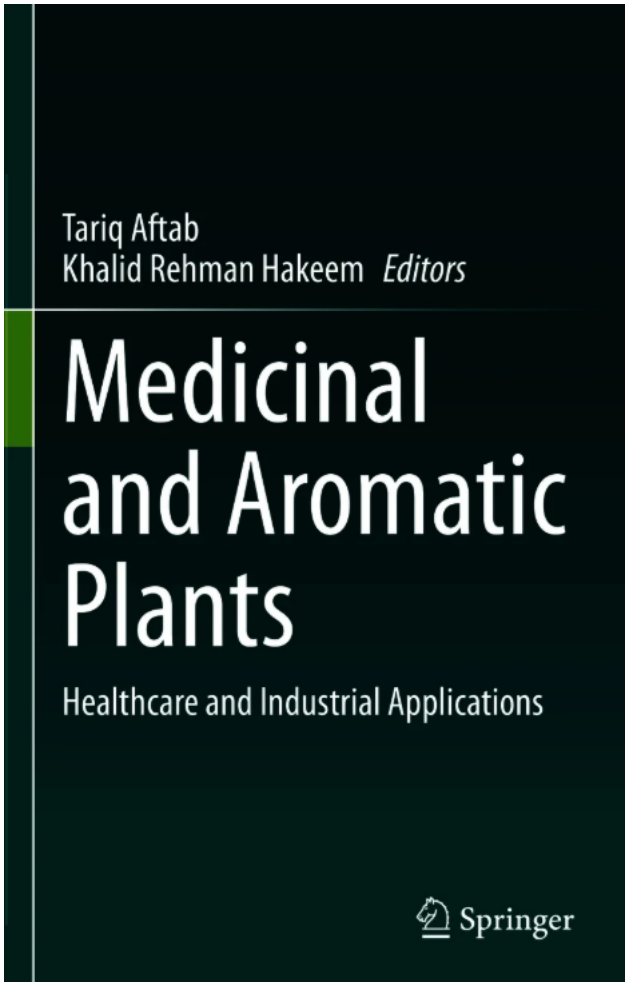

Figure 1. Snapshot of the book.