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An Overview on Medicinal Plants, Their Uses and Pollination in Angiosperms

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Abstract – India is among the most important countries regarding ancient healing traditions. Its rich array of medicinal plants is used both in commerce and by local populations. However, unfortunately only a small percentage of these medicinal plants are cultivated. The plants years together are propagating by natural way with different means of reproduction and to some extent they are also cultivated for some or other value. The exploitation of such plant species to the extent of extinction made alarming situations worldwide to conserve them for sustainable use. The situation brought them to the list of red data book. Such plant species should be conserved in their natural home and should have been reproduced artificially by studying their intricate mechanism of reproduction in the niche of ecological conditions. Pollination is the transfer of pollen grains from the anther to the stigma. It is one of the most critical stages in the life cycle of flowering plants, involving a complex series of cell-cell interactions that constitute the pollen- pistil interaction. In this Article, we studied the concept of Medicinal Plants, their uses and Pollination in Angiosperms in detail.

Keywords: Medicinal Plants, Pollination, Plants, Angiosperms, Ecology etc.

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I. INTRODUCTION

As medicinal plant use has become more popular worldwide, concern about plant conservation and sustainability has increased. According to the medicinal plant specialist group of the International union for the conservation of Nature and Natural Resources (I.U.C.N.), more than 20,000 plant species are used medicinally worldwide. These medicinal plants ensure health security for human being on one hand and their propagation and conservation can provide economic benefit to the poor and unemployed people on the other hand. The science of pollination ecology and floral biology has, however now been mainstreamed in biodiversity conservation [1]. In 1990s, most of the Agriculturists around the world were concerned about the worldwide decline of pollinator diversity. They prompted policymaker at the Fifth Meeting of the Conference of Parties (COP) of the Convention on Biological Diversity (CBD) to launch an International initiative for the Conservation and Sustainable use of pollinators (International Pollinators Initiative or IPI) in 2000. Fifth Meeting of the Conference of Parties (COP) considered this to be a crosscutting initiative within the programme of work on agricultural biodiversity to promote coordinated action worldwide, and so requested the development of a Plan of Action for the IPI. In seed plants, pollination is a prerequisite for fruit and seed development. It is the basis of genetic exchange between plants and recombination within plants. Pollination initiates many changes in the pistil and ovary. Many of the changes induced by pollination are observed in the lower part of the style and ovary. Post pollination changes in the pattern of RNA and protein synthesis and in the activity of several enzymes occur in the lower part of the style and ovary before the arrival of the pollen tube. These changes are specific to self and cross-pollination in self- incompatible taxa. In angiosperms, the pollination mechanism includes three phases i.e. release of pollen from anther, transfer of pollen from anther to stigma and finally successful placement of the pollen on the receptive stigma surface, followed by germination of pollen grain, which begins the next phase of fertilization. Each of the three phases shows great diversity. Three pollinating agents (two abiotic, and one biotic i.e. many species of animals) are involved in effective pollination [2].

II. MEDICINAL PLANTS IN INDIA

The term of medicinal plants incorporate a different sorts of plants utilized in herbalism and a portion of these plants have a medicinal exercises. These medicinal plants consider as a rich assets of fixings which can be utilized in drug improvement and synthesis. Other than that these

plants assume a basic job in the improvement of human cultures around the entire world [3].

India has a rich culture of medicinal herbs and spices. In India, of the 17,000 species of higher plants, 7,500 are known for medicinal uses. This proportion of medicinal plants is the highest proportion known for their medical purposes in any country of the world. India is considered as gold mine of well recorded and traditionally well practiced knowledge of herbal medicine. Several attempts are made to explore indigenous knowledge on use of these common medicinal plants for the treatment of diseases related to various systems of human beings. The northern part of India represents a great diversity of medicinal plants because of the majestic Himalayan range. So far about 8,000 species of Angiosperms, 44 species of Gymnosperms and 600 species of teridophytes have been reported in the Indian Himalaya of these 1,748 species are known as medicinal plants. The maximum medicinal plants (1,717 species) have been reported around the 1,800 m elevation range. On the regional scale, the maximum species of medicinal plants have been reported from Uttaranchal followed by Sikkim and North Bengal. The trans-Himalaya sustains about 337 species of medicinal plants, which are low compared to other areas of the Himalaya due to the distinct geography and ecological marginal conditions. As of today, Himalayan plants are a major contributor to the herbal pharmaceutical industry both of India and other countries. Additionally, a few plants consider as significant wellspring of nutrition and because of that these plants suggested for their therapeutic values. These plants incorporate ginger, green tea, pecans and some others plants. Different plants their subsidiaries consider as significant hotspot for dynamic fixings which are utilized in aspirin and toothpaste [4].

Nowadays the expression "Alternative Medicine" turned out to be exceptionally regular in western culture, it center on utilizing the plants for medicinal reason. In any case, the present conviction that medicines which come in capsules or pills are the main medicines that we can trust and utilize. Indeed, even so the greater part of these pills and capsules we take and use during our day by day life originated from plants. Medicinal plants oftentimes utilized as crude materials for extraction of dynamic fixings which utilized in the synthesis of various drugs. Like in the event of laxatives, blood thinners, antibiotics and antimalaria meds, contain fixings from plants. Besides the dynamic elements of Taxol, vincristine, and morphine confined from foxglove, periwinkle, yew, and opium poppy, individually [5].

Table 1: Uses of Medicinal Plants [6]

Local name	Botanical name	Part used	Used to cure
Neem	Azadirachta indica	Root, bark, flower	Arthritis, bronchitis, cough, diabetes
Ashok	Saraca asoca	Bark Flower	Menstrual Pain, uterine disorder, diabetes.
Kalonji	Nigella sativa	Seeds	Diarrhoea, dysentery
Tulsi	Ocimum sanctum	Leaves	Antiallergic, antidiabetic
Brahmi	Bacopa monnieri	Whole plant	Nervous, memory enhancer, mental disorder.
Dhatura	Dhatura stramonium	Leaves and fruits	Asthma, cardiac pains
Sandal Wood	Santalum album	Heart wood, oil	Skin disorder, burning sensation, jaundice, and cough.
Khajoor	Phoenix dactylifera	Fruit	Genito-urinary ailments, diarrhea
Satavari	Asparagus racemosus	Tuber, root	Enhance lactation, general weakness, fatigue, and cough.
Anar	Punica granatum	Seeds, flowers	Syphilis, bronchitis, stomachic
Paiya	Prunus cerasoides	Bark, fruit	Antipyretic, leprosy
Methi	Trigonella foenum	Seeds	Constipation, diabetes
Peepal	Ficus religiosa	Bark, leaves, fruit, seeds, latex	Skin diseases, neuralgia, constipation and gynecological disease
Ajwain	Thymus vulgaris	Seeds	Antiseptic, antispasmodic
Amla	Emblica officinalis	Fruit	Vitamin –C, cough, diabetes, cold, laxative, hyperacidity

2.1 Characteristics of Medicinal Plants

Medicinal plants have numerous qualities when utilized as a treatment, as follow:

- **Preventive medicine**- It has been demonstrated that the segment of the plants likewise describe by their capacity to forestall the presence of certain diseases. This will decrease the utilization of the chemical remedies which will be utilized when the disease is available i.e., lessen the symptom of synthetic treatment.

- **Synergic medicine-** The elements of plants all interface at the same time, so their uses can supplement or harm others or kill their conceivable negative impacts.

- **Support of official medicine**- In the treatment of complex cases like cancer diseases the parts of the plants demonstrated to be powerful.

III. ROLES AND VALUES OF POLLINATORS AND POLLINATOR DEPENDENT PLANTS BEYOND AGRICULTURE

There is a wide diversity of values linked to pollinators and pollination beyond agriculture and food production. Pollinators and their habitats provide ecological, cultural, financial, health, human, and social values. Pollinators enhance the reproduction and genetic diversity of around 80% of the plant species. More than half of plant species are self-incompatible or dioecious and completely dependent on biotic pollination. These plants are critical for the continued functioning of ecosystems as they provide food, form habitats and provide other resources for a wide range of species. Some examples include mangroves, dominated by obligate out breeder plants, which provide important services such as preventing coastal erosion, supporting fisheries, protecting from flood and salt intrusion, providing wood fuel and timber, as well as habitat and food provision for bees and

many other species (e.g. birds, mudskippers) among others. Another example are tropical forests, as they contain a high number of dioecious species, contributing to climate regulation, wild meat, malaria and other diseases regulation, fruits and seeds that support many other species in the forest, among other services [7].

IV. POLLINATION IN ANGIOSPERMS

In order to utilize the plant species in a judicious way as a resource, a thorough knowledge about the reproductive need including pollination is required. In angiosperms, the pollination is typically developed in three phases, release of pollen from anther, transfer of pollen from anther to stigma and finally successful placement of the pollen on the receptive stigma surface followed by germination of pollen grains which brings the next phase of fertilization. Adaptive significance of the variation in traits associated with sexual reproduction necessitates the understanding of reproductive biology of living organisms. In angiosperms, anthers and ovules are the structures within which microspore and megaspore formations take place respectively through meiosis. The ovule corresponds functionally to a megasporangium and thus is the 'promise' of a future seed. Microsporogenesis is directly followed by one or two cell divisions, yielding a pollen grain consisting only of two or three cells at the time of anther dehiscence [8]. Megasporogenesis results in the formation of a linear tetrad of megaspores with or without any partition wall formation which by further division, contribute to the development of the monosporic or bisporic or tetrasporic female gametophyte. In angiosperms the male and female gametophytesare remote and remain isolated from each other because of the enclosure of the ovules within the ovarian cavity of the gynoecium. Pollen grains from the dehisced anthers of the stamen are required to be transferred to the receptive stigma of the carpel. Sexual reproduction or syngamy involves the fusion of the male gametes developing from the male gametophyte and the female gamete produced by the female gametophyte. One of the outstanding characteristics of angiosperms is the participation of both male gametes in an act of fusion: one unites with the egg to form a diploid zygote, from which an embryo originates, while the other gamete fuses with one or several polar nuclei to initiate the endosperm formation by the process of double fertilization [9].

A pollen grain carries within it the partially developed male gametophyte. The pollen grain remains surrounded by a sporopolleninousexine that protects the tender male gametophyte from desiccation and other environmental hazards. The successful destination of an angiospermous pollen grain is the receptive surface of a conspecific and compatible stigma where it can germinate. As there is considerable uncertainty in the process of pollen transport, out of the total number of pollen grains produced by a flower, only a small number are able to reach a compatible stigma. Also, each species is characterized by its own duration of pollen longevity [10].

CONCLUSION

Directly numerous nations face enormous increments in the quantity of individuals experiencing diseases like diabetes, diarrhea, cancer, rheumatism, inflammation, jaundice, hepatic obstruction, pain, cold, cough, and so on remedies from medicinal plants are utilized with progress to treat the disease. Employments of medicinal plants are tried and true and utilized by individuals worldwide and no symptoms and savvy contrast with other system of medication. With the evolving situation, there is a need to improve and advance the preservation and development of normal assets for medicinal plants. Notwithstanding the prerequisite for preservation of medicinal plants it has additionally turned out to be fundamental to ensure and patent the conventional information. Pollination biology is critical to continue the expansion of efficiency of monetarily and medicinally significant plant species for human being to meet the nourishment emergency in developing populace, which is an earnest requirement for human welfare. Climate change adversy affects the modification of environment, which eventually influence the plant-pollinator arrange system. In the event that abiotic components cause critical changes of environment because of worldwide climate changes, at that point it can modify the planning of outflow of unpredictable organic compounds, which eventually influence the capacity of pollinator fascination or plant barrier. In this manner plant-pollinator interchanges could be influenced by the modification of unstable compounds. Investigation of pollination biology of medicinal plants can uncover fascinating data on the communication and connection between the plants and pollinators of a particular district. Medicinal plants have a promising future in light of the fact that there are about half million plants the world over, and a large portion of them their restorative exercises have not examine yet, and their therapeutic exercises could be unequivocal in the treatment of present or future examinations.

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