Review Article

An Overview on Fungal Diseases in Angiospermic Plants

ABSTRACT

The main objective of this review study is to examine the effects of fungi diseases on angiospermic plants as a result of unfavourable conditions like nutrient deficiencies, unsanitary environmental conditions, and less enriched soil that cause the various diseases by their unique fungi causal agents and lose their beneficial importance. Angiospermic flora are the most useful and marketable plants, employed for the majority of purposes, contributing to a better environment and spreading positive energy, but these flowering plants are presently damaged by unfavourable environmental conditions. The occurrence of fungal infection suppresses the beauty, growth, production and commercial values of flowers and also affect the living beings by increasing air pollution due to the infected plants. Fungicides, chemicals and molecular techniques are already in used to enhances the yield of crops and growth of plants, but still more research needs to be conducted to find the way for increasing the yield and preventing the plants more.

KEY WORDS: Fungal diseases, Angiospermic plants, Pathogens, Fungicides, Pathological Study, Plant-Pathogen interactions

INTRODUCTION

Angiosperms, or flowering plants, are classified as bearing seeds inside the ovary and producing fruit. They are true vascular plants since angiospermic plants have roots, stems, and leaves that are actually separate from one another. The angiosperms are diverse organisms. These plants are widespread around the world. Only angiospermic plants undergo double fertilisation or triple fusion. The globe over, flowers are utilised for a wide variety of functions and are a symbol of the natural beauty of the earth. The fungi are non-vascular, non-motile, heterotrophic and eukaryotic organisms. Fungi produces the number of different spores that causes the disease ‘s symptoms in the plants. It can cause the necrosis which is associated with some other symptoms like: leaf spot, canker, dieback, blight scab, anthracnose, mildew damping-off etc, the fungal symptoms can inhibit the growth of the plants or induce the abnormal or infected plants.

FUNGAL DISEASES IN ANGIOSPERMS

Initial leaf symptoms of the illness were a yellowish staining, which was followed by the emergence of variously sized grayish-white lesions on Tulip plant leaves. Blossom blight, a disease *Phytophthora cactorum* historically caused in Tulip plants, was discovered before the diseases mentioned above. *Pythium dissotocum, P. afertile, P. sylvaticum,* and other *Pythium* species were identified as the causal organisms for the current disorders [1]. Strawberry is a very delicious and popular fruit in the whole world and used for different purposes at different places, but certainly the productivity of

strawberry fruit has been declined due to the infection caused by the fungi which causes the various diseases such as Botrytis gray mold rot (*Botrytis cinereal*), leafspot (*Ramularia tulasnei*), anthracnose (*Colletotrichum fragariae*), powdery mildew (*Sphaerotheca macularis*), crown rot & leather fruit rot (*Phytophthora cactorum*) and black root rot (*Pythium* spp., *Fusarium s*pp.), etc and reduced the quality and yielding of the fruit. But now the several fungicides have been produced to control the infection and protect the plants [2].

Tagetes erecta is a most growing flowering plant in the world which are used for the different purposes and every occasion especially in India, but the yielding of the flowers has been less due to the fungal infection in the plant's parts mainly on flowers & leaves. The leaf spot and flower blight diseases has been found due to their causal pathogens as *Alternaria tagetica*, which reduced the productivity of flowers and inhibit the growth as well [3]. *Hibiscus* plants are very useful for many purposes which belongs to Malvaceae family and these flowering plants are found in all over the world, but now the various diseases have been produced day by day due to the fungal causal organisms that inhibit the growth and development of the whole plant and shows the reduction in the quality and quantity as well [4].

To enhance the growth of Hibiscus plants, several cultivars were used, which affects the organisms and stop to producing more diseases in plants. The Root knot nematodes causes the growth suppression, poor yielding and decreases the harvesting efficiency of *Hibiscus* crops and the infection further increases in the plants due to the presence of causal fungus in the soil that produces more diseases in the plants [5]. The very serious diseases caused by the *Botrytis cinerea* in the many crops and mainly the development of this pathogen has been starts after yielding because of the weather conditions which are favourable for this organism and the gray mold disease were produced in the crops which affects the growth of the production and quality as well. But to prevent the crop from this disease, various fungicides was used which kill the organisms and helps to enhance the yielding of the crops [6]. Silene latifolia is a biennial or short-lived perennial plant which have its very high economic rates but due to some environmental factors the Anther smut disease has been appeared on the flower due to its causal pathogen *Microbotryum violaceum* and the genetic variations has been reported in this plant. The flowering plants was protected by the chemical treatment and molecular techniques [7].

The various diseases were found in the seedlings of *Hibiscus* plants due to the soil borne fungi, which deduce the growth, good quality of fibres and appearance of flowering plants, but now various chemical treatments with fungicides were used to stop this infection and to kill the identified organisms such as *Rhizoctonia solani, Pythium* spp., *& Fusarium* species and these chemicals also enhance the growth of the plants [8]. Every plant has their medicinal properties inside it and the extracts of the plant's material provide protection from the external causal organisms. In the crop of *Capsicum annum*, the number of fungal infections has been reported due to some environmental conditions and lack of essential requirements in the plants. The main diseases of *Capsicum* are Anthracnose which is caused by the two main fungal species like as *Colletotrichum capsici* and *Gloeosporium piperatum*. The both fungi produced the conidial spores on the plants and mycelial

would be grown on the plant's parts. In the recent research, the leaf extracts and some fungicides were used to inhibit the growth of conidia on the plants and prevent the plants from the further infections [9].

The fungal contaminants were detected in the most of angiosperms with the help of PCR primers technique. From the *Dahlia* (Asteraceae) flowering plant, a number of DNA samples were extracted to identify the fungal contamination in Maxico. A simple screening test were used for detecting the fungal infection in angiosperm that reduce the possibility of gathered damaged leaves. More techniques were also used for the identification of fungal infection in angiosperm's DNA [10]. The most effective chemical treatment was developed as *Serratia plymuthica* HRO-C48 to control the infection of diseases Verticillium wilt caused by *Verticillium dahlia* and *Phytophthora* root rot caused by *Phytophthora cactorum.* This biological product was used for the Strawberry plants for stop the growth of the pathogens and kill them and this was so effective which were reported in the nursery, green houses and fields of Germany [11].

Many surveys were conducted in USA to investigate the fungal pathogens which was associated with *Eichhornia crassipes* in rivers and lakes. The outcome of the surveys showed that the different fungal organisms has been identified from this hydrotropic plant which causes the distinct diseases such as leaf lesions caused by *Colletotrichum, Stagonospora*, *Myrothecium*; colonising leaf tissue caused by *Mycosphaerella, Didymella*, etc. [12]. The several kinds of spores were reported on the fruiting and flowering plants in Taiwan and these different types of spores causes the brown root rot diseases in the plants due to the inoculation of fungal organism Phellinux noxius because of the bad environmental conditions. These diseases affect the plants and inhibit the growth as well, but the various chemical treatments have been used to deduce the infection and prevent the plants [13].

Catharanthus roseus is a very popular flowering plant as well as medicinal plant, which is found in all over the world. The several alkaloids are obtained from the extract of *Vinca* which are used for the anticancerous purposes such as vincristine, vindesine, vinorelbine, vinblastine, and the most novel alkaloid is vinflunine. This is a host specific plant of endophytic fungi and the number of fungi were isolated from the different parts and their tissues of Vinca plant from two separate regions in North India. The most common fungal pathogens are *Alternaria*, *Cladosporium, Aspergillus*, etc. Here, fungi also play a positive role as mutual symbionts by producing natural bioactive compounds that helps to prepared the medicines and cure the several diseases [14]. Previously in 1987, *Plasmopara halstedii* pathogen were infect *Helianthus annuus* plants and caused a harmful downy mildew disease in the region of USA and Europe. Another outbreak of downy mildew disease also caused in *Helianthus annuus* plants by *Plasmopara halstedii* in the commercial field of Thrace, part of Marmara (Turkey) during spring season of 2007 & 2008. This disease was commonly produced in the raining season with low temperature range and decreased the yield of this flowering plants [15].

In the commercial nursery of Poland, the various symptoms of growth abnormalities were seen as shoot proliferation, leaf resetting and malformation in the 3year old Ash tree plants. These symptoms were identical to another ash yellow disease connected with the group of *Phytoplasma* like;

Candidatus Phytoplasma fraxini in USA. These pathogens have been commonly found in the ornamental crops as *Magnolias, Roses* ash leaf maple tree that related with the growth abnormalities and this is the first data on the appearance of *Candida Phytoplasma asteris* in Poland [16]. *Tithonia diversifolia* is the maximum producing flowering plant in the world and this is present throughout the year shows their perennial nature. At presently, the number of plants were identified as infected by the occurrence of powdery mildew diseases from the region of Meghalaya in June-July 2007. The pathogenicity has been confirmed when the formation of different kinds of spores were reported on the plants [17]. The disease on leaf was observed from the rose plants by using the molecular techniques as PCR, BLAST analysis during June 2008 in Gorakhpur (India) and the leaves of the Rosa plant become yellowish and the growth has been stopped of the plants due to the fungal infection of *Candidatus asteris* that inhibit the production and induce the abnormal parts of the plants. This fungal pathogen causes the various diseases in other plants as well like Sesame, Desert rose (*Adenium obesum*) along with the *Rosa alba* [18].

The extract of these three plants (*Lawsonia inermis, Punica granatum, Hibiscus sabdariffa*) were used to control the fungal, bacterial contamination in flowering plants. The material is used in their natural form for herbal medicines or purified form in pharmaceutical industry. These 3 different extracts were used to check their ability to inhibit the growth of fungal and bacterial pathogens which are becoming a threat to living beings [19]. *Jasminum sambac* is the most growing flowering plant because of its attractive fragrance and appearance. Nowadays the yielding of various flowers was less due to the occurrence of infection by pathogens as *Colletotrichum truncatum, C. siamense*, which causes the diseases leaf and fruit anthracnose in the plants. These diseases were identified by using the molecular phylogeny techniques and the techniques also helps to inhibit the further growth of the pathogens in the plants [20].

Chrysanthemum plants have very elegant flowers of golden colour which belongs to the Asteraceae family and these plants grows around the world due to their maximum uses and yielding. However, now it is too hard to preserve the flowers for long period of time because due to the weather conditions the flowers get damaged by the fungal organisms. The several diseases such as leaf blight, leaf spot, rust, wilt and bacterial blight has been found in the flowers due to their specific pathogen and the diseases causes the maximum loss in the growth and quality of the flowers also affected. To deduced the infection in the crops, the biofungicides and bioagents was used and protect the plants from another diseases [21]. Nowadays to decrease the infection in the crops, the number of bioagents and fungicides were used, but now the diseases was controlled by the association of bioagents and some medicinal botanical plants. The most effective bioagent is Trichoderma which is consists of 7 different forms such as T1, T2, T3, T4, T5, T6 and T7 and out of these 7 agent's forms, the maximum inhibition of wilt diseases was observed by T3 form and the more effective botanical plant were *Mentha arvensis* (MA) and stop the growth of *Fusarium oxysporum chrysanthemi* (Foc) [22].

The flower blight disease in *Chrysanthemum* was the most critical disorder which reduce the quality and quantity of the flowers. This disease was caused by the many fungal pathogens such as

Alternaria alternata, Botrytis cinereal, Itersonilia perplexans, Mycosphaerella lingulicola and *Stemphylium vesicarium*. Due to the environmental conditions, the fungi grown very quickly on the field crops and the different kinds of spores has been produced on the flowers which inhibit the growth of the flower that reported in the fields of New Zealand. The various fungicidal treatments were applied to identify the symptoms of diseases and prevent the plants from the disorders. These chemical fungicides control the spore germination and kill the germinated spores that act as protectants of the flowering plants [23].

The number of airborne mycosporophytes was spreading on the *Helianthus annus* crop due to the external impact of environmental parameters. These fungal spores were reported in the different classes of fungi, each class having individual quantity, which was found in the parts of *Helianthus* plants and the most common fungal spore is *Cladosporium*, that infects the flowering plant and causes the diseases. These tiny mycospores were observed by using the special equipment volumetric Tilak Air Sampler. This air sampler has great spore collection capacity and provides nonstop volumetric information of air sampling for 1 week and allow to analyse the microbial population in both quantitative and qualitative ways [24].

Ornamental plants are the beauty of nature that provides a lot of positive vibes in religious events. The better production of these flowering plants increases the economic status and its commercial values in a whole world. But, with the passage of time, various infections have been caused due to their causal organisms and leads to the problems in the growth of the plants. The main reason of the entry of fungal components is through infected dormant flowering buds and the fungal pathogens produces a number of conidia spores in the form of chain structure which are rapidly dispersed by wind and spread the different diseases in plants. The several chemical agents can be used to stop the infection and prevent the plants from diseases [25]. *Catharanthus roseus* is the perennial flowering plant and this is also known as *Vinca rosea.* this plant contains the ornamental properties as well as medicinal properties which helps to cure the various diseases in human beings and plants as well. But nowadays the properties have been reduced due the formation of fungal organisms which affects the whole plant and causes the several diseases. The main causal pathogen is *Colletotrichum gloeosporioides* causes the twig blight disease in the plants and the dark brown to black colour lesions were appeared as symptoms after the rainy season. These symptoms were identified by the morphology of fungal spores, which were formed on the parts of plants [26].

The Human fungal pathogen *Candida albicans* affects the number of plants which belongs to the Apocynaceae family. This fungal organism inhibits the growth and development of the plants and causes the diseases in individual parts of the plants. Every plant has their medicinal values by which treat the causal diseases with the help of additional techniques and chemicals. A Microtiter Plate Assays technique were used to evaluate the causal organisms and also using some extracts of plant's parts to identify the pathogens. The most effective leaf extracts of *Catharanthus roseus* are petroleum ether and distilled water, both shows their positive effects to inhibit the growth of *Candida albicans* [27]. *Hibiscus sabdariffa* is a cosmopolitan flowering as well as medicinal plant. This is commonly cultivated in Upper Egypt having about 94% yielding of its total production. But, the

productivity get decreased due to the occurrence of some fungal diseases, mainly root rot, damping-off and wilt diseases that stop the growth of the whole plant from root to leaves by the formation of these several pathogenic soil borne fungi linked with the rotted roots were *Fusarium oxysporum, F. solani, F. equiseti, Rhizoctonia solani* [28].

The *Fusarium* wilt fungal disease is a major problem for the crop of *Chrysanthemum* flowers because due to the interference of the pathogen in the plants and their parts, the plants do not grow as well and the heavy loss has been occurred in the flower production. The disease was spread very quickly when the environmental condition was favourable for the pathogens and the moderate temperature, more humidity helps to growth and multiplication of the pathogens which stop the vascular system of plants without any external support [29]. In the cultivation of Tulip bulbs, the *Fusarium oxysporum* is a major obstacle because this fungal species infects the plant and inhibit their growth. Various tests were performed for the detection of the pathogens in the different species of Tulip plant and the main evaluation was done by the help of soil infection test and spot inoculation test with the addition of suitable markers and resist the plants to the *Fusarium oxysporum* causal organism [30].

Tagetes flowering plants are very popular and growing in around the world and its parts are also used as medicinal purpose. In Bangladesh, the several diseases were reported in each part of the *Tagetes* plant, especially in two species of *Tagetes as T. erecta and T. patula*. Commonly leaf spot, foliage blight, grey mold, powdery mildew and anthracnose diseases are found in the most of the plants, but the foliage blight disease is caused due to the causal agent *Aspergillus fumigatus* in *Tagetes.* The two methods (tissue planting and blotter method) were used by using various chemical agents for the detection of diseases [31]. The three main species of *Stagonosporopsis*, which are morphologically identical, but phylogenetically different were affecting the *Chrysanthemum* and *Pyrethrum* flowering plants and caused the ray blight disease in both plants. Ascomata group provided help to the fungal pathogens in their survival and dispersal on the ray florets of *Chrysanthemum* and leads to necrosis of ray florets. Ray blight disease was also found in the commercial *Pyrethrum* in Kenya and Tanzania, while the plants were most infected in Australia and reduce the quantity as well as quality as yielding [32].

Sorghum bicolor is a very popular cereal which is grown in the world and produced a number of natural products by using its high rich sources. Nowadays the occurrence of diseases is so common in every plant and causes a lot of side effects. In *Sorghum bicolor,* leaf spot diseases were causes by the fungal pathogen *Bipolaris sorghicola* and infect the whole plant. To reduce the variations of the pathogen in Sorghum plant, molecular markers (RAPD, RFLP, SSR, ISSR, URP-PCR) were using. These three main RAPD, ISSR, URP-PCR molecular markers help to identify the causal organism and stop the growth of pathogen by the help of their primers [33]. *Chrysanthemum* is the mature flowering plant which is grown for the commercial purposes in the world. These ornamental plants obtained maximum yielding because of their better growth, but due to the weather conditions, the plants were infected by the fungi that causes the diseases in the plants and reduced the production as well as quality of the crop that leads towards the more loss in the economic status. In *Chrysanthemum*, the following diseases were identified in the different parts of the plants like leaf

blight, leaf spot, rust wilt, bacterial blight which are resistant to the biotic and abiotic stresses. The foliar blight diseases caused by *Alternaria chrysanthemi*, which produces the number of spores on the plants that causes the weakness in the plants and the plants became died. These several diseases have been inhibited by using the various alternate fungicides [34].

Tagetes erecta is a demanding flowering plant which is used for every purpose to grace the events. This plant is growing very easily along with its good adaptability in the habitats and its commerciality increases the economic status with high yielding. But since few decades, the several diseases were found in the Marigold plant due to some causal pathogens such as flower blight caused by *Alternaria zinnia*, wilt & stem rot caused by *Phytophthora* spp., *Cercospora* leaf spot caused by *Cercospora megalopotamica*. To control the efficacy of these diseases, a field experiment was conducted in the laboratory by the Pathology Department in 2014-2015 by using some fungicides and biofungicides that control the effects of pathogens and prevent the plant to less yielding. Bavistein & Captan gave the best result to inhibit the variation of disease & its pathogens [35].

Presently, the Orchids are produced in very huge amount as exotic ornamental plant in whole world and its products are transported to the other countries as well. But nowadays, the occurrence of diseases is very common in plants and the disease also moves into the other places along with the plants, where this fungus has not been found previously and spreading very quickly in maximum number. In Orchids, the *Fusarium* species is identified as pathogen that infects the plants and reduce the quality and yielding of the flowers and causes the diseases as leaf and flower spot, leaf and sheath blight, root rots, wilting. Molecular techniques were used to identify the causal symptoms and the treatment also [36].

In January 2018 to April 2019, three trials were carried out for the investigation and survey on Rose's diseases from the different places. Most of diseases were identified in Rose plants such as, leaf blight, leaf spot, black spot, powdery mildew, mosaic, rust, flower blight, dry brown spot, dieback, foot rot, etc. The major disease of Rose plant is powdery mildew which is caused by *Podosphaera pannosa*, recently recorded in Jashore (distt. of Bangladesh) and the highest number of leaf spot disease were found in Panisara, while the black spot disease was maximumly identified from Singair. In addition, Researchers conducted a survey on farmer's socio-economic conditions and issues with growing Roses in Bangladesh and noted their personal opinion for cultivation of Rose plants [37].

FUNGAL INFECTION IN PLANTS- A SERIOUS CONCERN

The occurrence of diseases in plants is very serious for the farmers and others as well. Disease caused the various side effects on the plant's parts and decreases the quality and yielding of the crops. But, now a number of alternative methods was used to reduce the power of the pathogens prevent the crop to damaging. In this paper, researchers extract some bacterial strains from the bacteria *Bacillus subtilis* (*spizizenii*) were used for the controlling of leaf blight caused by *Alternaria alternata* in *Tagetes erecta*. This bacterial strain MM19 is most effective to inhibit the further progress of diseases in crops [38]. A field trial was conducted at the experimental farm of Agriculture Department during the two alternate seasons in 2011 & 2012 to test the impacts of the culture filtrates

that applied on the Rose crops for their protection from the black spot & powdery mildew diseases which are caused by their specific pathogens *Diplocarpon rosae wolf* & *Sphaerotheca pannosa*. Two culture filtrates prove very effective in controlling the progress of diseases in Rose plants which were named as *Pseudomonas fluorescence* & *Trichoderma viridi*. The sprinkling of these bioassay chemicals on the *Rosa* plants enhance quality of flower and increases their production [39].

Downy mildew is very serious disease in plants, which is formed by their pathogen *Peronospora Danica* and this was investigated in the *Chrysanthemum* plants of Japan. The disease affects the production of the flowers and expands the whole plant. The fungal infection was decreased by using the thermotherapy means treatment with hot water and hot air and biofungicides as spray on the unhealthy plants. A major difference has been appeared between healthy and infected plants [40]. Ornamental plants are very essential for the whole world which provide the grace to each part of earth, but now the huge reduction has been observed in the production and actual quality of the flowers because of the occurrence of several diseases in the plants by their specific causal organisms. These diseases affect the development of crops and create more loss in economy. The most common disease is *Fusarium oxysporum chrysanthemi*, *Alternaria* leaf spot, sooty mould found in *Chrysanthemum* plants and these diseases were also identified in other crops as well [41].

Powdery mildew is very serious diseases which occurred in the plants especially in *Tabernaemontana divericata* flowering shrub plant. The number of infected leaves were identified due to the diseases Powdery mildew caused by fungal pathogen *Erysiphe elevata* that produces the conidial spores on the plants which inhibit the growth of the plants. To stop the infection and enhances the growth of the plants, various fungicides and molecular techniques were used [42]. *Triticum aestivum* is a well growing cereal crop which is used to make the number of products for edible purpose. But, in the present past the various diseases caused by their causal organisms such as *Puccinia triticina* in the wheat crop and the diseases reduce the purity of wheat grains and leads to the economic losses. To control the spreading of diseases from one plant to the other plant, some resistant cultivars were extracted that provide protection against the popular races of pathogens and cure the wheat crops. Several advanced techniques were used to identify and characterized the diseases and its pathogens, like transcriptomics, RNA sequencing, bimolecular fluorescence complementation, virus-induced gene silencing and other approaches [43].

Ornamental plants are playing a major role to enhance the glory of the entire world, but fungal infection causes the diseases in flowering plants that reduce the aesthetic values of the plants and damaged the crops leads to the losses in the production. This is very critical problems to face the pathogenic infection and reduction in the yielding of the crop. But recently, the advance methods of molecular biology tools as spectroscopic and imaging technologies are investigated. These modern equipments helps to identify the causal symptoms and diseases in Rose plants by using fluorescence sensors, spot spectroscopy, hyperspectral, thermal imaging and also decreases the pathogenic effects from the plants [44]. The several diseases were observed from the ornamental plants in US, by which a lot of abnormalities has been produced in the flowering plants and their production. The main fungal component *Phytophthora drechsleri* was reported from the flowers of *Chrysanthemum*

that causes the diseases leaf blight, dieback, flower blight, foliar wilt in the rainy season along with high range of temperature because in this weather, the fungi produced the number of sporangia on the flower which stop the further development of plant. The different kinds of molecular techniques have been applied on the flowering plants to identify and control the diseases and some phytohormones was used to enhance the yielding and quality of flowering production [45].

The epidemic blast diseases infect the rice crops due to its fungal pathogen *Magnaporthe oryzae* and spoil the crops. For the weeds, diseases and pathogens management, several herbicides are widely used but these are not much effective. Among the herbicides, a new chemical agent Glyphosate was withdrawn which was used in the cultivation and this broad-spectrum chemical has antifungal property against the phytopathogens and its diseases to defense the transgenic rice crops. This well deployed chemical also has anti-sporulation power to reduce the spore formation in the rice plants and killed them [46]. The various fungal and bacterial diseases are controlled by using the Plant Growth Promoting Rhizobacteria (PGPR) as a manure and fungicides that helps to inhibit the growth of pathogens in the rice crops especially basmati rice crop. The production and yielding of rice grains has been reduced due to the infection of bacterial and fungal organisms in every part of the plant and causes the several diseases as bacterial leaf blight, brown spot, blast, sheath blight by *Pseudomonas, Bacillus, Chryseobacterium, Streptomyces*. PGPR helps to boost the development of the plant growth traits [47].

Microorganisms are play a vital role in the growth of plants, but these are harmful as well because these infects the root system of plants and inhibit the growth due to the formation of fungal pathogens in soil and causes the diseases in *Abelmoschus* plants. The volatile organic compounds secrets from the *Trichoderma viride* biofungicide in the soil were used to identify the effect of causal organisms on plants and stop the further growth of collar rot pathogen *Sclerotium rolfsii*. The strain BHU-V2 of the most popular biofungicides *T. viride* were used to reduce the effects of causal organisms under the ground and it also helps to enhance the development of the plant and it's all parts [48]. Vitis vinifera is the most materialistic valuable edible fruit grown in the whole world. But, number of diseases are produced by their causal organisms in the grapevine crops that deduce the productivity and quality of the crop. The most common diseases are Downy mildew and Powdery mildew which are caused due to their specific pathogens like as *Plasmopara viticola* belongs to oomycetes class and *Erysiphe necator* belongs to ascomycetes class, which supress the yield of the crop. These diseases were identified with the help of different classes of molecular defensive genes through the genome wide identification method. These defensive genes are very useful to protect the grapevine production from the powdery and downy mildew diseases and helps to improve the quantity as well as quality of the crops [49].

The most common diseases occurred in the flowering plants such as stem canker, foot rot, wilting, dieback, leaf drop, etc. The stem canker disease is caused by its specific causal organism as *Diaporthe tulliensis* in the *Jasminum officinale* and the symptoms were identified by using the such chemicals in in-vitro condition. Firstly, chlorosis symptoms were appeared on the flowers and also showed that leaves become fall from the branches of the plant. The diseases were controlled by the

help of molecular techniques and the chemical treatments [50]. *Tagetes erecta* is commonly known as the African marigold flowering plant which is cultivated as cosmopolitanly. But nowadays the flowering production have been decreased due the interference of diseases causal pathogens on the flowers of the marigold plants. The white cottony mycelial growth appeared on the flower as a whole covering that caused by fungal organism *Sclerotium rolfsii* and its association with other species as *S. sclerotiorum* and the diseases white mould rot is spreading day by day, which stop the growth of the flower and reduce the quality or yielding as well. The diseases were identified on the basis of the external morphological characters of the plants and molecular traits [51].

Conclusion

Following a review of many studies conducted by scientists from India and other nations, it can be said that the interaction with diseased plants, poor environmental conditions, a deficiency in essential minerals, and infertile soil are the main causes of fungal diseases in blooming plants. The combination of these factors results in a wide range of plant diseases, which lower plant productivity and worsen the financial situation of flowers. This has a negative impact on nature by lowering air quality, which is bad for people and the splendour of the entire planet.

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