Research Progress in Virus Identification and Control of Phytoplasma Diseases in Infected Flower Plants

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Abstract: Virus Disease of Flowers and Plants is a Kind of Serious Harm Caused by Virus. the Infection of Virus by Flower Plants Will Directly Affect the Ornamental and Economic Properties of Plants, Which is Not Conducive to the Healthy Development of Flower Industry. in This Background, Many Related Experts and Scholars Are Actively Studying the Virus Diseases of Flowers and Plants, and Constantly Enrich and Improve the Research Literature of Virus Identification Technology and Control Measures. in Order to Provide Some Inspiration for the Virus Research of Flower Plants, This Paper Systematically Combs and Summarizes the Current Domestic Literature on the Direction of Virus Identification and the Prevention and Control of Phytoplasma Diseases, and Explores the Corresponding Research Progress.

1. Introduction

1.1 Literature Review

The Virus of Flower Plants Has an Important Harmful Effect on the Growth of Flower Plants. According to Liu Yang and Yu Changshong, for the Ornamental and Economic Value of Flowers and Other Ornamental Plants, the Flower Virus Will Cause Huge Adverse Effects and Hinder the Development of Flower Industry (Liu and Yu, 2016). Yang Dongying, a Scholar, Explored the Characteristics and Control Methods of Garden Flower Diseases and Insect Pests. It is Found That According to the Resistance of Garden Flowers to Pests, the Introduction of Pest Control Technology in Garden Protection Can Reduce the Damage of Pests to Flowers and Plants, So as to Avoid Environmental Pollution Caused by Pesticide Abuse (Yang, 2015). Zhang Pengyu and Zhang Xiaoying Studied and Analyzed the Non Infectious Diseases and Infectious Diseases, and Based on These Two Dimensions, Proposed the Prevention and Control Measures for the Main Diseases of Flower Seedlings (Zhang and Zhang, 2018). Zhou Qun Scholars Pointed out That Compared with Chemical Control, Biological Control Has Advantages in Economy, Safety, Pollution Degree and Drug Resistance, Which Conforms to the Advanced Concept of Pollution-Free Production and Consumption Demand in the Current Era (Zhou, 2016).

1.2 Research Purposes

With the Improvement of Social and Economic Level and Quality of Life, More and More Attention Has Been Paid to the Ornamental and Economic of Flowers and Plants. the Healthy Growth of Flowers and Plants Can Play an Important Role in Purifying the Air and Beautifying the Environment, Which is Conducive to the Rapid Development of Urbanization. However, for Flower Plants, the Harm of Virus Infection Will Cause Serious Threat to the Normal Growth and Reproduction of Plants. Moreover, in the Process of Urban Green Development, Diseases and Insect Pests Have Caused Great Damage to the Roots, Stems and Leaves of Plants, Which Has Become One of the Key Problems of Green Development. Therefore, It Has Become a Key Issue for the Development of Flower Industry to Explore the Identification of Virus Infecting Flower Plants and to Study the Control Measures of Plant Pathogens. Based on the Related Research of Flower Plants, This Paper Discusses the Common Viruses Infecting Flower Plants. At the Same Time, the Main Techniques of Virus Identification and the Control of Phytoplasma Were Analyzed, Hoping to Provide Some Ideas and Inspiration for the Control of Flower Plants.

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2. Common Viruses of Flowers and Plants

Virus disease is a disease caused by virus infecting plants. Generally speaking, most flower plants can be infected by virus, such as orchid, lily, rose, peony, chrysanthemum and so on. At the same time, a virus can not only infect some plants, but also cause infection, such as cucumber mosaic virus. In addition, for flower plants, they may also be infected by a variety of viruses.

Tobacco mosaic virus can infect more plant types, usually tobacco and Solanaceae plants are more susceptible to infection. When tobacco mosaic virus infects flower plants, the lateral veins of young leaves in the main body of plants will change, and the branches will also produce lesions, and the exposed veins of plants will become more and more transparent. The tissue on both sides of the vein of the flower plant infected with tobacco mosaic virus will emit light green. And the overall thickness of the leaves of the plants is not the same, the color is yellow and green mixed or there is a large area of dark brown necrotic spot, which will be twisted and curled up. Some flower plants will also appear dwarfing phenomenon, the growth rate of plants will be reduced, and the normal flowering and fruiting process can not be carried out.

At present, cucumber mosaic virus has the widest distribution and the largest host range, which is mainly caused by the infection of cucumber mosaic virus and melon mosaic virus. There are 36 families of dicotyledons and 124 species of cucumber mosaic virus in monocotyledons. The transmission of cucumber mosaic virus is mainly through friction and aphids. More than 60 aphids can transmit the virus. When the flower plants were infected, the leaves appeared yellow and green mottling, and the middle and lower leaves presented brown necrotic mottling along the main lateral vein. The infected leaves will appear the condition of leaf rewinding, the leaves will shrink, and finally the infected leaves will gradually wither.

Compared with the two viruses mentioned above, the infection range and infected plants of melon mosaic virus are less, the virus specificity is higher, generally only Cucurbitaceae plants will be infected. Melon virus is active only in the host. In the remains of the diseased plants, only a few muskmelon viruses can last for days or months. There are three symptoms in plants infected with melon mosaic virus. First, the heart leaves are in the state of open veins, and then gradually become dark green lesions and leaf deformities, the whole plant can no longer bear fruit. Second, the upper part of the leaf appears chlorotic yellow spot, then develops into mottled flower leaf state, and the edge of the leaf appears serration. Thirdly, the necrotic and chlorotic spots and stripes on the plant leaves are irregular, and the lesions will be Dwarfing and atrophic seriously.

3. Research Progress of Virus Identification At This Stage

At present, the research of flower plant virus detection technology is more popular, and many domestic scholars have explored it. In Orchidaceae plants, freesia mosaic virus is one of the main viruses, which has a serious impact on the ornamental value of orchids. According to the sequence of coat protein gene of fremv, a set of specific primers and optimized conditions were introduced to construct RT-LAMP detection method. The results showed that the specific amplification of fremv could be achieved by using primers, and the reaction was independent, and it did not react with cucumber mosaic virus, bean yellow mosaic virus, dentate orchid ringspot virus and Jianlan mosaic virus. Compared with RT-PCR, RT-LAMP is more sensitive, and the difference between them is about 10 times (fan et al, 2019).

Feng Jia, Li Gang and other scholars detected and identified the virus and viroid molecules infecting Feicheng peach. During the experiment, the plant samples were collected and the total RNA of leaves was extracted. The typical symptoms of flowers and leaves, mottling and shrinking were selected. Then the specific primers of 12 major viruses and viroids were introduced to detect the RT-PCR of plant samples. The results showed that PLMVd, PNRSV, ACLSV, hsvd and other target fragments of the expected size were obtained in the amplification products. After cloning, sequencing and comparison, it was found that the sequence consistency between the plant samples and the reported isolates has exceeded 90% (Feng et al, 2017).

In recent years, there are many other kinds of flower plant virus detection. For example, the

transient expression of flower petals and the establishment of virus-induced gene silencing system were reported by β - glucosidase gene Gus and anthocyanin synthesis key transcription factor gene gmyb10, which were successfully constructed by Agrobacterium vacuum osmosis (Tang et al, 2017). For example, in plant virus detection, improved application of sequencing technology. Based on a specific ecological environment or planting system, the total nucleic acid samples are processed by using ngs to achieve the full acquisition of virus sequence. Then, combined with a number of NGS data, analyze the genome changes of viruses in infected plants, and construct virus quasispecies, so as to fully grasp the origin and law of plant viruses (Zhan and Zhou, 2018).

4. Research Progress of Phytoplasma Disease Control

The plant pathogenic bacteria, which are transmitted by the Hemiptera insects that feed on the phloem, such as planthoppers, stink bugs, leafhoppers and wood lice, can cause the disease risk of more than one thousand plants in the world. Therefore, the research of phytoplasma disease is extensive and in-depth. Geng Xiansheng and Shujin scholars reviewed the latest research on the spread of phytoplasma disease and summarized the control methods. Thus, the transmission process and influencing factors of phytoplasma disease were summarized, which provided important theoretical support for the study of phytoplasma disease (Geng et al, 2015).

Lu Hengyu and other scholars summarized the research situation of phytoplasma from four aspects: classification, molecular detection methods, main transmission routes and comprehensive control. Systematic review of the main research literature of phytoplasma at this stage provides important reference materials for later research (Lu et al, 2016).

Zhao Xuejun and other scholars selected Beibei area of Chongqing as the sample area and mulberry leaves with atrophic disease as the research object. The primers were r16f2n / r16r2 and 16mf2 / r16mr1. The 16S rDNA gene molecular detection technology was mainly used to amplify and collect the whole DNA. The sequence of phytoplasma was determined by clone sequencing and NCBI comparison. At the same time, the sequence of reported phytoplasma of mulberry atrophic disease was used as the parameter to analyze the homology of the sequencing results. After comparative analysis, it was found that the phytoplasma belonged to 16SrI subgroup. The comparison results provide a clear data reference for the prevention and control of the pathogen of mulberry atrophic disease, which is of great practical significance (Zhao et al, 2017).

5. Conclusion

At present, the virus of flowers and plants has the characteristics of diversity, strong adaptability and high harmfulness, which has a significant adverse effect on the cultivation and growth of flowers and plants. Generally speaking, the production of flower virus is mainly due to the accumulation of virus caused by vegetative propagation, the low scientific and technological content of protected cultivation, and the increasingly frequent international flower and plant exchanges. This environment creates convenience for the rapid spread of flower plant virus, which seriously affects the development of flower industry. After combing and summarizing the domestic research literature, it is found that there are many studies on virus identification and disease control of specific flowers and plants, but the research on virus control with strong general adaptability is a little weak. In this regard, it is suggested that future relevant research can start from the characteristics of major imported flowers and plants, and explore the transmission characteristics and control measures of typical viruses, so as to create a good industrial atmosphere for international plant exchanges.

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