Antibacterial Activity of Crude Extracts of 6 Medicinal Plants Against 4 Plant Pathogenic Fungi

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Abstract: Objective: To study the antibacterial activity of crude extracts from 6 medicinal plants against 4 plant pathogenic fungi. Method: The antibacterial activities of 6 medicinal plants against Fungi Imperficti, Fusarium oxysporum, Pythium aphanidermatum and Phytoph-thora capsici were observed. The results showed that the crude extracts of Lycoris radiata, Zingiber officinale and Xanthium sibiricum had good antibacterial effects on four pathogenic fungi. Among them, Lycoris radiata and Xanthium sibiricum had obvious antibacterial activities against Fusarium oxysporum, and the antibacterial rates were 90.17% and 85.58% respectively. Zanthoxylum bungeanum can inhibit Fungi Imperficti and promote the growth of other three pathogenic fungi. Conclusion: The crude extracts of Lycoris radiata and Xanthium sibiricum have extensive antibacterial activities. The antibacterial rates of Lycoris radiata and Zingiber officinale against four plant pathogenic fungi were more than 70%, and the antibacterial rate against Fungi Imperficti was as high as 90%. The antibacterial rate of Xanthium sibiricum to Fungi Imperficti was more than 85%. Therefore, these two plants contain certain agricultural antibacterial components, which can be used as two potential plant derived pesticide development resources and have good antibacterial activity.

1. Introduction

The main significance of the research on the antibacterial activity of medicinal plant extracts against plant pathogenic fungi is to provide scientific solutions for plant diseases, which is also related to one of the key topics in modern agricultural production. The main cause of crop damage is plant pathogenic fungi, which can’t be avoided. The study of extracts also provides more possibilities for the treatment of crops. Pathogenic fungi are one of the important pathogens causing various plant diseases, which often become the top enemy of plant disease sources. Although the use of pesticides has become more and more standardized, there is still no effective solution to the problem of pesticide residues. In order to increase crop yield and quality, modern agricultural production is still very passive and can’t get rid of the dependence on chemical fertilizers and pesticides [1]. In western developed countries, large-scale use of synthetic pesticides was prohibited a few years ago. Due to the high toxicity of pesticides, some pesticides are often difficult to degrade. In addition, there are problems such as acute toxicity and long degradation cycle, especially the accumulation of many toxins in the food chain, resulting in the excessive use and abuse of pesticides, causing serious pollution to the environment. In addition, the most important thing is the impact on the development of children. With the improvement of people’s living standards, especially with the improvement of environmental protection awareness and the strengthening of food safety awareness, people pay more and more attention to safety, and the demand for effective pesticide substitutes is also increasing. Plant derived bacteriostatic pesticides have become a research hotspot at present. Taking the crude extracts of Lycoris radiata, Xanthium sibiricum, pepper fruit, Impatiens balsamina, Andrographis paniculata and Zingiber officinale as the research object, this experiment studied the antibacterial effects of four common crop diseases: Fungi Imperficti, Fusarium oxysporum, Pythium aphanidermatum and Phytoph-thora capsici, so as to provide a theoretical basis for the separation and purification of active substances in the later stage [2].

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2. Materials and Methods

2.1 Materials

Fruits of Lycoris radiata, Zingiber officinale, Impatiens balsamina, Andrographis paniculata, Xanthium sibiricum and Zanthoxylum bungeanum were picked in the park. After collection, put it into a sterile bag, take it back to the laboratory for cleaning and treatment, and store it in a refrigerator at 5 ℃. Zanthoxylum bun-geanum and Xanthium sibiricum fruit were purchased from the traditional Chinese medicine store near the unit. Fungi Imperfecti, Fusarium oxysporum, Pythium aphanidermatum and Phytophthora capsici were provided by the fungus laboratory of our hospital [3-4].

2.2 Method

The antibacterial activities of 6 medicinal plants against Fungi Imperficti, Fusarium oxysporum, Pythium aphanidermatum and Phytoph-thora capsici were observed.

2.3 Main Instruments and Reagents

The main instruments selected for this test are: DHG-9157A electrothermal constant temperature drying oven (Beijing Guohong Experimental Equipment Co., Ltd.); KG-SX-510 steam sterilization machine (Shanghai Xinglin Medical Instrument Co., Ltd.); EV925MF7-NRH microwave oven (Ningbo Fangtai Kitchen Appliance Manufacturing Co., Ltd.); C23-SDHCB49 electromagnetic oven (Zhejiang SUPOR Co., Ltd.); VS-1302L-U ultra clean workbench (Hangzhou Ankang Air Technology Co., Ltd.); RH62K6152S9 / SC refrigerator (Japan Siemens (China) Electronics Co., Ltd.); RXZ-290B intelligent artificial climate box (Ningbo DONGLUN Health Technology Center); ME223E / 02 electronic balance (Mettler Toledo instrument (Shenzhen) Co., Ltd.), etc.

2.4 Test Method

2.4.1 Preparation Process of Plant Crude Extract

Weigh and grind Lycoris radiata, Xanthium sibiricum, pepper fruit, Impatiens balsamina, Andrographis paniculata and Zingiber officinale into powder. Put the six powdered plants into a 500ml triangular glass flask. During the preparation process, divide each glass flask into six different colors, and then add 250ml deionized water, 250ml petroleum ether and 250ml anhydrous ethanol respectively. The sealing film shall be used for encryption sealing, and the corresponding marks shall be made, and then it shall be put into a shaking table with a speed of 125r / min. The shaking table is a key step, not only for high-frequency vibration. After three days of repetition, pour out the mixed liquid, filter it into the collection bottle marked with different colors and affix labels. Then put the filtered solid residue back into the original triangular glass bottle, add 200ml of original extract and put in shaking table at the same speed for two days. After 2 days, put each mixture into different color collection bottles (the method is the same as above), and then repeat the same method, but the shaking time of the shaking table at the same speed is reduced to 1 day. After 1 day, the extract is poured into the designated collection bottle in the same way. The extract of 6 kinds of plants is put into the rotary evaporator for rotary evaporation respectively. The deionized water is set at 85 ℃, the absolute ethanol is set at 72 ℃, and the petroleum ether is set at 42 ℃, so as to obtain the paste and weigh it. Fix the volume with ethanol to 0.005g/ml and store it in a refrigerator at 5 ℃ [5].

2.4.2 Antibacterial Activity Test

Use a 0.5cm diameter punch to punch holes in the culture dish of plant pathogenic fungi cultured for 8 ~ 10d, and then stick labels with the culture medium mixed with plant crude extract (concentration: 0.005g / ml) for control analysis. The formula is: mycelial growth inhibition rate (%) = (control colony diameter - treatment colony diameter) / (control colony diameter - cake diameter) × 100%.

3. Results and Analysis

3.1 Antibacterial Activities of Crude Extracts of 6 Plants Against 4 Pathogenic Fungi

According to the results of antibacterial activity of six plant crude extracts against four pathogenic fungi, different six plant crude extracts have different antibacterial effects on four different pathogenic fungi. It can also be seen that different plant crude extracts, such as Lycoris radiata, Zingiber officinale, Xanthium sibiricum and Andrographis paniculata, have good antibacterial effects on four pathogenic fungi. Lycoris radiata and Xanthium sibiricum had obvious antibacterial activity against Fusarium oxysporum, and the antibacterial rates were 90.17% and 85.58% respectively. It can be seen that these common medicinal plants have good antibacterial effect. The antibacterial rates of Impatiens balsamina and Andrographis paniculata were 84.15% and 83.28%, respectively. In addition to the bacteriostatic effect of Zanthoxylum bungeanum on Fungi Imperficti, the effect of Zanthoxylum bungeanum on the other three pathogenic fungi is mainly reflected in that it can promote the growth to a certain extent.

3.2 Study on Antibacterial Activity of Crude Extracts of 6 Plants Against 4 Pathogenic Fungi

The crude extracts of Lycoris radiata and Xanthium sibiricum have a comprehensive antibacterial effect and can meet a wide range of antibacterial applications. At the same time, the antibacterial rates of crude extracts of Lycoris radiata and Zingiber officinale against four plant pathogenic fungi are more than 70%, which further proves the potential of its effect, in which the antibacterial rate against Fusarium oxysporum is as high as 90%. The bacteriostatic rate of Xanthium sibiricum to Fusarium oxysporum was more than 85%. Therefore, these two plants contain certain agricultural antibacterial components, which can be used as two potential plant derived pesticide development resources, and they have good antibacterial activity.

4. Conclusion and Discussion

In terms of the research on the antibacterial activity of plant extracts against pathogenic fungi, the antibacterial effects and functions of some non precious common medicinal materials and food materials deserve attention and research. It is also an important alternative direction for the development of antimicrobial pesticides from plant extracts at this stage. The results showed that the crude extracts of Lycoris radiata and Xanthium sibiricum had a wide range of antibacterial activities. The antibacterial rates of the crude extracts of Lycoris radiata against four plant pathogenic fungi were more than 70%, of which the antibacterial rate against Fungi Imperficti was as high as 90%. This is a very high proportion, and the inhibition rate of Xanthium sibiricum to Fungi Imperficti is more than 85%, which is also a very high inhibition rate. It can be seen that the above two plants are potential development products of very good antimicrobial agents, and their good agricultural antibacterial value is worthy of attention. They can be effectively developed as two potential botanical pesticides. In the process of development, attention should be paid to the orderly and scientific development of these medicinal plant resources to maintain the stability and sustainability of medicinal plants, so as to serve agricultural bacteriostasis. In addition, in the study, it was further found that Zanthoxylum bungeanum had certain antibacterial effect on Fungi Imperficti, and promoted the growth of other pathogenic fungi to varying degrees. The growth promotion rate of Pythium aphanidermatum and Phytophthora capsici reached more than 60%, and the antibacterial effect of Impatiens balsamina and Andrographis paniculata was also very good. Meanwhile, although there are some differences in the inhibitory effects of six different medicinal plant extracts on the mycelial growth of four plant pathogenic fungi, Fungi Imperficti, Fusarium oxysporum, Pythium aphanidermatum and Phytoph-thora capsici, we can continue to pay attention to their “compound” working ability, that is, the combined force of more than two medicinal plant extracts [6]. The results of this study show that from the perspective of plant derived biocontrol antibacterial active substances, it is necessary to avoid the use of some liquids affecting the extraction of medicinal plants as far as possible, so as to reduce the adverse effects of growth promoting components on the antibacterial effect.

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