Integrated Green Prevention and Control Techniques for Kiwifruit Canker Disease in "Guichang" Kiwifruit in Xiuwen County, Guizhou Province

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Abstract Kiwifruit canker disease seriously affects the yield and quality of "Guichang" kiwifruit in Xiuwen County, Guizhou Province. In order to scientifically, safely, greenly and efficiently prevent and control the disease, theory was combined with prevention and control techniques to optimize existing prevention and control techniques, so as to improve the production yield and quality of kiwifruit. Specifically, biocontrol strains targeting local kiwifruit canker disease were screened, and reduced and mixed use of agrochemicals with improved efficiency was studied; and the effects and application techniques of disease resistance inducers and bioorganic fertilizers in inducing systemic disease resistance in kiwifruit trees were explored, and finally, an integrated green prevention and control scheme for kiwifruit canker disease that is suitable for kiwifruit production areas in Guizhou Province and has strong operability was proposed. This study provides technical support for green, efficient, standardized production technical services and sustainable and healthy development of kiwifruit industry.

Key words Kiwi; *Pseudomonas Syringae* pv. *actinidiae* (Psa); Symptom; Occurrence rule; Integrated control
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As a key competitive fruit industry developed in Guizhou Province[1], kiwifruit was identified as a characteristic and advantageous tree species for the key fruit industry developed in the rural industrial revolution of the province in 2019. Xiuwen County is the third largest kiwifruit production area in China, mainly cultivating variety "Guichang", and Kiwifruit cultivation has become a leading agricultural industry in the local area[2-7]. At present, the bacterial canker disease of kiwifruit caused by the pathogenic variant of *Pseudomonas Syringae* pv. *actinidiae* (Psa) in kiwifruit has greatly hindered the development of the kiwifruit industry[8-10]. The disease develops rapidly, and has multiple infection pathways, resulting in a high mortality rate after infection[11-12], making it the largest disease faced in the cultivation of "Guichang" kiwifruit in Xiuwen[13-20]. Currently, chemical control is mainly used for prevention and control, but due to drug abuse, phytotoxicity, and concurrent diseases and phytotoxicity, it has caused serious problems such as land pollution, increased control costs and drug resistance[5-14]. In this study, with the green prevention and control of the main disease—kiwifruit canker disease of kiwifruit industry in the "Guichang" zone of Xiuwen County as the research object, innovative green comprehensive prevention and control techniques for kiwifruit canker disease were integrated. Specifically, biocontrol strains targeting local kiwifruit canker disease were screened, and reduced and mixed use of agrochemicals with improved efficiency was studied; and the effects and application techniques of disease resistance inducers and bioorganic fertilizers in inducing systemic disease resistance in kiwifruit trees were explored, and finally, an integrated green prevention and control scheme for kiwifruit canker disease that is suitable for kiwifruit production areas in Guizhou Province and has strong operability was proposed. This study provides technical support for green, efficient, standardized production technical services and sustainable and healthy development of kiwifruit industry.

Methods

Field control effect of microbial inoculants

Experimental inoculants *Bacillus amyloliquefaciens* (Shandong Greenblue Biotechnology Co., Ltd.); *Bacillus subtilis* (Shandong Greenblue Biotechnology Co., Ltd.); *Clostridium butyricum* (Shandong Greenblue Biotechnology Co., Ltd.); *Bacillus coagulans* (Shandong Greenblue Biotechnology Co., Ltd.); *Enterococcus faecalis* (Shandong Greenblue Biotechnology Co., Ltd.); *Bacillus licheniformis* (Shandong Greenblue Biotechnology Co., Ltd.); *Paenibacillus mucilaginosus* (Baoding Ruigu Biotechnology Co., Ltd.); *Trichoderma harzianum* (Shandong Hongxinyuan Chemical Co., Ltd.); *Lactobacillus plantarum* (Shandong Greenblue Biotechnology Co., Ltd.); *Pediococcus pentosaceus* (Shandong Greenblue Biotechnology Co., Ltd.).

Experimental field The experiment was carried out at the planting base of Guizhou Wojia Yongxu Agricultural Development Co.,

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Ltd. , which had moderate soil fertility and cultivation management level.

Experimental methods The above microbial inoculants were prepared to a concentration of 1×10^8 cfu/g. The experiment included 11 treatments, 10 microbial inoculant treatments and 1 blank control, and the inoculants were applied at a rate of 75 kg/hm^2. The experiment was carried out in 3 replicates, and there were a total of 33 plots, each of which had an area of 666.7 m^2. As for the experimental application period, the inoculants were applied when transplanting tree seedlings, and a blank control was set with no application of inoculants. The number of diseased plants were investigated and recorded in mid April, and the rate of diseased plants and prevention effect were calculated using following formula.

$$\text{Rate of diseased plants (\%)} = \frac{\text{Number of diseased plants}}{\text{Number of investigated plants}} \times 100$$

Screening of commercial agents and study on reduced and mixed use with improved efficiency

Experimental agents Single bactericide: Based on the results of preliminary experiments, the concentration gradients of bactericides was set, and required mass concentrations of drugs were achieved by diluting with sterile water. The mass concentrations of various agents were as follows: 46% copper hydroxide WG: 0, 12.5, 25, 50, 100, 200 mg/L, 20% bismerthiazol WP: 0, 12.5, 25, 50, 100, 200 mg/L, 3% zhongshengmycin WP: 0, 12.5, 25, 50, 100, 200 mg/L, 6% kasugamycin WP: 0, 12.5, 25, 50, 100, 200 mg/L, 0.3% tetramycin AS: 0, 12.5, 25, 50, 100, 200 mg/L, 0.5% oligosaccharin AS: 0, 12.5, 25, 50, 100, 200 mg/L, 1.5% benziothiazolinone EW: 0, 50, 100, 200, 400 mg/L, 45% amobam AS: 0, 50, 100, 200, 400 mg/L, 30% cuppric nonyl phenolsulfonate ME: 0, 50, 100, 200, 400 mg/L, 20% thiediazole copper SC: 0, 50, 100, 200, 400 mg/L, and 0.3% tetramycin AS + 3% zhongshengmycin: 0, 12.5, 25, 50, 100, 200 mg.

Compound bactericide: 0.3% tetramycin AS 100 times + 3% zhongshengmycin WP 100 times, 0.3% tetramycin AS 200 times + 3% zhongshengmycin WP 200 times, 0.3% tetramycin AS 300 times + 3% zhongshengmycin WP 300 times, and 0.3% tetramycin AS 400 times + 3% zhongshengmycin WP 400 times.

Methods for determining antibacterial activity A UV spectrophotometer and liquid culture method were used for determining antibacterial activity. In specific, a previously prepared suspension of kiwifruit pathogen and prepared agents of different mass concentrations were added at a ratio of 1 : 1 into 50 ml of LB culture medium, and the medium was placed in constant temperature shakers according to the prepared mass concentration gradient of each agent to incubate the pathogen for 2 d at 28 ℃ and 180 r/min. Each group of treatment was done in 3 replicates, with sterile water as a blank control. After the culture was completed, 2 ml of bacterial suspension was taken from each test tube and centrifuged at 4 ℃ and 5 000 r/min for 10 min. The precipitate was then taken out and added with 2 ml of sterile water. Each bacterial suspension was then blown with a pipette to make it turbid and added into cuvette, and the *OD* value of the bacterial suspension at this time was measured at 595 nm with a UV spectrophotometer and recorded. According to the *OD* values, the antibacterial rates of different agents were calculated using following formula. A toxicity regression linear equation for the antibacterial rates against kiwifruit canker pathogen at different mass concentrations of each agent was established with the mass concentration of the agent as the x-axis and the antibacterial rate as the y-axis. The EC_{50} value of the antibacterial rate of each agent against kiwifruit canker pathogen was calculated.

$$\text{Antibacterial rate (\%)} = (OD_2 - OD_1)/OD_2$$

In the formula, OD_2 represents the *OD* value of sterile water, and OD_1 represents the *OD* value of the kiwifruit canker bacterial suspension after bactericide treatment.

Experimental methods of field control effect The experiment was carried out at the planting base of Guizhou Wojia Yongxu Agricultural Development Co. , Ltd. , with moderate soil fertility and cultivation management level. The experimental field was evenly divided into five experimental plots, each consisting of approximately 40 – 50 kiwifruit plants. Based on *in-vitro* activity, two bactericides with the best activity were selected for compounding. The entire trees were sprayed according to corresponding concentration of the compound bactericide for three times. The experimental application periods was: early May (early stage of leaf disease), early November (after fruiting in autumn), and mid January (early stage of winter disease). Additionally, no bactericide application was set as a blank control. The number of diseased plants was investigated and recorded in early March, and the rate of diseased plants and prevention effect were calculated using following formulas.

Rate of diseased plants (%) = (Number of diseased plants/Number of investigated plants) × 100

Prevention effect (%) = [(Number of diseased plants in blank control – Number of diseased plants with bactericide application)/Number of diseased plants in blank control] × 100

Field control effect of combined use of disease resistance inducer and bioorganic fertilizer on kiwifruit canker disease

Experimental agents Disease resistance inducers: 6% ascorbic acid aqueous solution, 5% prohexadione calcium, 1.2% indobutyric acid aqueous solution, and 5% naphthylacetic acid aqueous solution, all of which were commercially available.

The combination of disease resistance inducer and bioorganic fertilizer: Bioorganic fertilizer 75 t/hm^2 + 6% ascorbic acid aqueous solution 500 times, bioorganic fertilizer 60 t/hm^2 + 6% ascorbic acid aqueous solution 500 times, and bioorganic fertilizer 45 t/hm^2 + 6% ascorbic acid aqueous solution 500 times.

Field control effect The experiment was carried out at the planting base of Guizhou Wojia Yongxu Agricultural Development Co. , Ltd. , with moderate soil fertility and cultivation management level. The experimental field was evenly divided into five experimental plots, each consisting of approximately 40 – 50 kiwifruit plants. The bactericides were sprayed during the bud stage, young fruit expansion stage, and at end of fruit picking. Additionally, no bactericide application was set as a blank control. The number of diseased plants was investigated and recorded in mid April, and the rate of diseased plants and prevention effect were calculated according to corresponding formulas.

Results and Discussion

Field activity of microbial inoculants

The experimental results in Table 1 showed that the incidence rate in kiwifruit was low after the application of *Bacillus* inoculants, among which *B. subtilis* inoculant had the best activity.

Screening of commercial agrochemicals and study on reduced and mixed use with improved efficiency

Inhibitory effects of bactericides on kiwifruit canker pathogen

From Table 2, it can be seen that the tested bactericides showed certain inhibitory activity against the kiwifruit canker pathogen, with EC_{50} values of 76.90, 95.69, 60.04, 70.79, 46.56, 178.26, 212.41, 89.83, 270.20, 328.23 μg/ml, respectively. Among them, 0.3% tetramycin AS had the best inhibitory activity against kiwifruit canker pathogen, with an EC_{50} of 46.56 μg/ml, followed by zhongshengmycin, with an EC_{50} of 60.04 μg/ml. After compounding the two bactericides with the best antibacterial activity, an antibacterial activity test was conducted, and its EC_{50} was 42.11 μg/ml. The activity of the combination was superior to the antibacterial activity of single bactericides before compounding: tetramycin AS and zhongshengmycin.

Table 1 Field activity of microbial inoculants

Microbial inoculant	Rate of diseased plants//%
Bacillus amyloliquefaciens	23.8
Bacillus subtilis	20.1
Clostridium butyricum	45.3
Bacillus coagulans	31.7
Enterococcus faecalis	47.8
Bacillus licheniformis	20.5
Paenibacillus mucilaginosus	25.3
Trichoderma harzianum	43.6
Lactobacillus plantarum	46.7
Pediococcus pentosaceus	49.3
Clear water (control)	52.8

Table 2 Inhibitory activity of ten agrochemicals on kiwifruit canker pathogen

Bactericide	EC_{50}//μg/ml	Correlation coefficient (*R*)	Toxicity regression equation
46% copper hydroxide WG	76.90	0.999	$y=1.1818x+1.5697$
20% bismerthiazol WP	95.69	0.990	$y=1.0037x+3.0118$
3% zhongshengmycin WP	60.04	0.998	$y=2.3294x+0.8572$
6% kasugamycin WP	70.79	0.961	$y=2.4526x+2.9963$
0.3% tetramycin AS	46.56	0.982	$y=1.1966x+3.0041$
0.5% oligosaccharin AS	178.26	0.986	$y=1.0919x+2.5410$
1.5% benziothiazolinoneEW	212.41	0.944	$y=0.0315x+43.3070$
45% amobam AS	89.83	0.996	$y=1.5801x+3.0864$
30% cuppric nonyl phenolsulfonate ME	270.20	0.979	$y=0.6683x+3.3749$
20% thiediazole copper SC	328.23	0.934	$y=1.0710x+2.3056$
0.3% tetramycin AS+3% zhongshengmycin	42.11	0.994	$y=1.1070x+0.9860$

Field control effects of compound agrochemicals on kiwifruit canker pathogen Based on the research under "Inhibitory effects of bactericides on kiwifruit canker pathogen", we studied the field control effect of the combination of bactericides: tetramycin AS and zhongshengmycin on the pathogen of kiwifruit canker. According to the experimental results shown in Table 3, it could be seen that the combination of 0.3% tetramycin AS and 3% zhongshengmycin with different concentrations had certain control effects on the pathogen of kiwifruit canker in the field. In specific, the combination of 0.3% tetramycin AS 100 times and 3% zhongshengmycin WP 100 times had the best control effect at 80.2% on the pathogen of kiwifruit canker. The control effect of 0.3% tetramycin AS 400 times and 3% zhongshengmycin WP 400 times was average, at 31.6%.

Table 3 Field control effects of compound agrochemicals on kiwifruit canker pathogen %

Compound agrochemical	Field control effect	
	Rate of diseased plants	Prevention effect
0.3% tetramycin AS 100 times+3% zhongshengmycin WP 100 times	9.2±2.4	80.2±2.1
0.3% tetramycin AS200 times+3% zhongshengmycin WP 200 times	13.4±2.6	71.2±3.5
0.3% tetramycin AS 300 times+3% zhongshengmycin WP 300 times	20.6±2.3	55.7±2.5
0.3% tetramycin AS 400 times+3% zhongshengmycin WP 400 times	29.4±1.8	36.8±1.4
3% zhongshengmycin WP 100 times+6% kasugamycin WP 100 times	18.3±2.6	60.6±1.7
3% zhongshengmycin WP 200 times+6% kasugamycin WP 200 times	21.2±1.4	54.4±2.4
3% zhongshengmycin WP 300 times+6% kasugamycin WP 300 times	26.2±3.5	43.7±1.5
3% zhongshengmycin WP 400 times+6% kasugamycin WP 400 times	31.8±2.9	31.6±1.3
Clear water (control)	46.5±3.1	0.0±0.0

Field control effects of combined use of disease resistance inducer and bioorganic fertilizer on kiwifruit canker disease

Field control effects of plant growth regulators on kiwifruit canker pathogen The results in Table 4 showed that all five drugs had good inhibitory effects on kiwifruit canker disease. Among them, 6% ascorbic acid aqueous solution had the best prevention effect on kiwifruit canker disease (53.2%).

Field control effects of combined use of bioorganic fertilizer and plant growth regulator on kiwifruit canker disease The field control effects of adding bioorganic fertilizer and applying 6% ascorbic acid aqueous solution before and after flowering on kiwifruit canker disease were investigated. The results showed that when 75 t/hm^2 of bioorganic fertilizer and 6% ascorbic acid aqueous solution 500 times were adopted, the rate of diseased plants was 10.8%, and the prevention effect was 69.8%, which was the best field control effect (Table 5).

Table 4 Inhibitory activity of plant growth regulators on kiwifruit canker pathogen %

Plant growth regulator	Prevention effect
6% ascorbic acid aqueous solution	53.2
5% prohexadione calcium	43.5
1.2% indobutyric acid aqueous solution	42.8
5% naphthylacetic acid aqueous solution	35.4
Clear water (control)	0.0 ±0.0

Table 5 Field control effects of combined use of bioorganic fertilizer and plant growth regulator %

Combination of bioorganic fertilizer and plant growth regulator	Field control effect	
	Rate of diseased plants	Prevention effect
Bioorganic fertilizer 75 t/hm^2 +6% ascorbic acid aqueous solution 500 times	10.8 ±3.2	69.8 ±1.5
Bioorganic fertilizer 60 t/hm^2 +6% ascorbic acid aqueous solution 500 times	12.6 ±2.4	60.4 ±2.9
Bioorganic fertilizer 45 t/hm^2 +6% ascorbic acid aqueous solution 500 times	19.3 ±1.9	56.3 ±2.5
Clear water (control)	48.9 ±2.7	0.0 ±0.0

Integrated Green Prevention and Control Techniques for Kiwifruit Canker Disease in "Guichang" Kiwifruit in Xiuwen County, Guizhou Province

Before planting

Before planting, disease prevention should be carried out, and the soil in the planting area should be tested for nutrient elements and ecological risk indicators. Based on the soil nutrient conditions of the planting area and the age and vigor of kiwifruit seedlings, appropriate tree load should be selected, and each tree should be pruned in a timely manner. Management measures such as bud thinning before flowering and fruit thinning after flowering should be taken. Adding a certain amount of disease resistance inducer and bioorganic fertilizer can reduce the risk of plant infection with kiwifruit canker disease. For example, ascorbic acid aqueous solution is commonly used as a disease resistance inducer for Psa, with a prevention efficiency of up to 60% and a yield increase of 20.56%, and the yield increase rate increases with the increase of agrochemical application, so the application rate of agrochemicals can be controlled reasonably to increase kiwifruit yield. Applying bioorganic fertilizer at a rate of 75 t/hm^2 and spraying 500 times dilution of 6% ascorbic acid aqueous solution before and after flowering can be adopted for prevention.

Planting period

During the planting period, it is necessary to strengthen planting management in kiwifruit planting areas, including ventilation management, soil testing and fertilization, irrigation management, and pest and disease management. Good ventilation and transparency should maintained in orchards, because ventilation and transparency not only allow plants to absorb more nutrients, grow healthily, and resist diseases and pests, but also make it difficult for bacteria to spread. Targeted fertilization should be applied at each stage of trees, including applying decomposed livestock manure in autumn and winter, and applying potassium fertilizer during flowering. Reasonable watering is necessary, as excessive or insufficient water can exacerbate the spread of kiwifruit canker disease. Before autumn and winter seasons when kiwifruit canker disease is most likely to occur, plant disease resistance inducers such as 6% ascorbic acid aqueous solution and oligosaccharins should be sprayed 2 – 3 times in summer and early autumn to enhance tree vigor and enhance plant disease resistance. When planting, *Bacillus subtilis* inoculant (75 kg/hm^2) can be applied to improve the disease resistance of fruit trees.

Applying a certain amount of agrochemicals or compound agrochemicals to the branches and trunks in the month from the end of picking to winter pruning can achieve the effect of preventing kiwifruit canker disease. The trees are applied 2 – 3 times in a month, with even intervals. Available agrochemicals include: 46% copper hydroxide WG 30 – 40 times dilution, 1.5% benziothiazolinone coating agent, 6% ascorbic acid aqueous solution 500 times dilution, 20% bismerthiazol WP 30 – 40 times solution, 0.3% tetramycin 50 – 55 times dilution, 6% kasugamycin WP 35 – 45 times dilution, and 3% zhongshengmycin 25 – 35 times dilution, or 0.3% tetramycin AS 100 times dilution and 3% zhongshengmycin WP 100 times dilution can be mixed at 1:1 for spraying.

After buds have just sprouted, a certain amount of agrochemicals can be sprayed to prevent and control the occurrence of flower rot disease, with even intervals. Available agrochemicals include: 0.3% tetramycin WP 900 – 1 000 times dilution, 6% ascorbic acid aqueous solution 500 times dilution, 6% kasugamycin WP 500 – 800 times dilution, 20% bismerthiazol WP 500 – 800 times dilution, 1.5% benziothiazolinone 500 – 800 times dilution, *etc.*

In the early stage of fruiting, entire trees can be sprayed with agrochemicals 1 – 2 times to control leaf spots, with an interval of 15 d. Available agrochemicals include: 3% zhongshengmycin AS 500 – 700 times dilution, 6% ascorbic acid aqueous solution 500 times dilution, 6% kasugamycin WP 500 – 700 times dilution, 0.3% tetramycin AS 700 – 900 times dilution, *etc.*

Kiwifruit canker disease cannot be easily detected in the early stage. When spots appear, the bodies of infected trees should be inspected to observe the incidence of the main trunk and main vine, and determine the severity of the disease. When the subcutaneous tissue of a tree undergoes canker and the phenomenon of cortical girdling occurs, diseased branches should be promptly removed from the orchard and burned. When the incidence is mild, only the lesion appears, and there is no subcutaneous canker, treatment measures can be taken on the bodies of trees. After the decayed part of the lesion is cut or scraped off, agrochemicals can be applied to it. When cutting the decayed part, it is necessary to vertically form wounds with a spacing of about 5 cm on the diseased spot, with a depth reaching the xylem and a length reaching the healthy part of the tree body. When scraping off diseased spots, it is necessary to thoroughly scrape them until the healthy skin of trees is exposed. The area where agrochemicals are applied is about twice the area of the diseased spots. The agrochemicals can be a combination of 0.3% tetramycin AS 100 times dilution + 3% zhongshengmycin WP 100 times dilution, and 3% zhongshengmycin WP 300 times dilution + 6% kasugamycin WP 300 times dilution. The agrochemicals are applied at an interval of 7 – 10 d, 2 – 3 consecutive times. The tools used in the treatment process, such as pruning shears, knives, and other tools that come into direct contact with the diseased area, will carry the pathogen of kiwifruit canker. Therefore, disinfectants should be used for disinfection treatment. All diseased branches and scraped materials containing the pathogen of kiwifruit canker should be taken out of the orchard and burned uniformly. During the cold season, attention should be paid to keeping kiwifruit trees warm. Kiwifruit canker bacteria are more active at low temperatures, and when kiwifruit trees are frostbitten, the spread of kiwifruit canker bacteria is more rapid. A whitening agent (lime sulphur) is applied evenly to the base of tree trunks and main branches to prevent the occurrence of freezing damage to branches. In early spring, plant disease inducers such as ascorbic acid aqueous solution and oligosaccharins can also be sprayed appropriately to enhance trees' own frost resistance and disease resistance.

After planting

After planting, it is necessary to remove any diseased or damaged bodies. Fallen branches, residual branches, leaves, flowers and rotten fruits, that have been infected with canker disease, should be taken out of orchards and burned. Timely treatment should be carried out after the appearance of the lesion. The decayed part on the lesion should be scraped off, and then agrochemicals such as benziothiazolinone and copper hydroxide should be applied. During the treatment process, the materials scraped off and all items that may contain bacteria should be taken out of orchards and burned.

Demonstration and prevention effect of green prevention and control techniques for kiwifruit canker disease

Referring to the methods and steps under "Methods" (investigation on the incidence of kiwifruit bacterial canker disease in Xiuwen County), a planting base (6 hm^2) was selected as the experimental orchard for "key techniques for integrated green prevention and control of kiwifruit canker disease" at the planting base of Guizhou Wojia Yongxu Agricultural Development Co., Ltd., with 0.33 hm^2 as the control experimental orchard area. The experimental orchard using the integrated green prevention and control techniques had a diseased plant rate of 5%, while the blank control area had a diseased plant rate of 35%. Through green comprehensive prevention and control technology, the prevention and control effect of kiwi canker disease has reached 85%. The five-point sampling yield measurement method for orchards was adopted for yield measurement. It was found that the average yield was 19 783.5 kg/hm^2, while the average yield in the control experimental orchard was 11 262 kg/hm^2. Compared with the control experimental orchard, the average yield in the orchard for technical experiment in this study increased by 8 521.5 kg/hm^2.

Conclusions

The results of this study showed that the control measures achieved ideal results. The green control measures had stable control effects, which were higher than 75%. The vertical and horizontal stems of kiwifruit planted in the demonstration orchard significantly increased, and the weight of single fruit significantly increased. Compared with the control area, the content of nutritional substances in kiwifruit planted in the orchard significantly increased. The implementation of the green prevention and control technique scheme for kiwifruit canker disease has brought good economic benefits to the orchards, which is in line with the current national disease prevention and control goals of "reducing agrochemicals and increasing efficiency" and the development requirements of green agriculture and environmentally friendly agriculture. Secondly, the previous disease prevention and control concept of kiwifruit canker disease in planting orchards was mainly based on treatment, and no importance was attached to prevention, resulting in serious occurrence of canker disease and difficulty in management. Through research, it is advocated to prioritize prevention and combine prevention and control measures to address the occurrence of canker disease. Plant growth regulators are used to induce plant disease resistance, supplemented by scientific bactericide application, to improve the utilization rate of bactericides. Furthermore, green prevention and control techniques require formula fertilization based on soil testing and increasing the application of organic fertilizer. Through the application of organic fertilizer, the tree vigor of kiwifruit trees is improved, thereby improving the disease resistance of trees themselves. In this study, we proposed a set of scientific and effective green prevention and control technical specifications for kiwifruit canker disease, which achieves a good effect through specific implementation plan including agricultural prevention and control, biological control, bactericide screening, reduced and mixed use of bactericides with improved efficiency, increased application of plant growth regulators, spraying of sterilization prevention on the surface of trees in autumn and winter, precise coating or spraying of bactericides on branches and trunks, and increased application of organic fertilizers in soil. The green prevention and control technical scheme for kiwifruit canker disease can promote green and sustainable development of the kiwifruit industry.

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