



# Binglike the Control Effect of Cabbage Soft Rot and Downy Mildew

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**Abstract.** The test showed: the Control effect of BingLiKe of different concentrations on Cabbage Softrot and Downy Mildew was better than that of 77% KeSha-De 800 dissolution and 25% Metalaxyl 500 dissolution, the percentage was 44.42%, 29.85%. BingLiKe also obviously promoted the growth of cabbage, increased its yield in contrast with Control.

**Keywords:** Binglike · Cabbage · Softrot · Downy Mildew · Field Control

## 1 Introduction

Chinese cabbage is evolved from canola. The chromosome number of  $2n = 2x = 20$ . Every 100 g of fresh vegetables contained 93–95 g water, carbohydrate 2.3–3.2 g, Protein 1.4–2.5 g, 30–40 mg of vitamin C, fiber 0.6–1.4 g, and other vitamins and minerals. Can make soup, Fried food, pickled [1]. Chinese cabbage is called the king of “hundreds of dishes,” with detoxification, long-term consumption is very conducive to digestion and health. Chinese cabbage in vegetable basket project in north China occupies an important position, it can adjust the off-season, bring some inspections [2].

Chinese cabbage soft rot, downy mildew, virus disease is the production of Chinese cabbage recurrent disease known as cabbage three major diseases. Downy mildew is one of the main disease of Chinese cabbage production, losses at 10% to 30% per year on average [3]. Soft rot, because of the epidemic is strong, serious harm, all can happen in the whole growth period. General in Chinese cabbage soft rot producing losses are more than 25% [4]. Individual years in northern region can cause Chinese cabbage production more than 50%, individual field even failed can cause; In the pit, can cause the whole cellar decay, loss [5].

The current Chinese cabbage soft rot and downy mildew mainly chemical control. Chinese cabbage soft rot prevention and cure is early before the disease or illness, with 72% of agricultural streptomycin sulphate 3000–4000 times 4000 times, the new plant toxin liquid antibacterial “401” 500–600 times liquid, 72% or 50% ammonium sen, enemy eriksson wettable powder 700 times liquid and 50% generation’s ring 500 times liquid alternates foliar spraying, such as 10 days, 2–3 times in a row. Strain, prompt removal soft rot disease at the same time around the hole or robust strains can be used 75% chlorothalonil 600–800 times liquid or bark feed Westwood solution 2000 times

liquid to close to the ground, petiole and stem base spraying or watering, lest they transmitted by water when the water [6]. The downy mildew prevention has often USES 40% ethyl phosphate aluminum wettable powder 150–200 times, 25% armor frost spirit wettable powder or 70% mancozeb wettable powder 500 times liquid, and prevention and control of 7–10 days apart, 2–3 times in a row [7].

With the continuous improvement of people's living standards, consumption idea, the production high quality, low toxicity and low residue cabbage to satisfy the needs in daily life, people has become very important [8]. Will be more strict with the use of pesticides. The future will be low toxicity and efficient green pesticide pesticides. Winding copper ammonia 14.5% wettable powder is a kind of medicine, fertilizer combination of fungicide, of fungi, bacteria have good control effect, the team has beat of Chinese cabbage soft rot disease in the preliminary research bacteriostatic test of indoor and outdoor test for the prevention and control of soft rot and downy mildew, and some good conclusions are drawn.

## 2 Materials and Methods

### 2.1 Drug

Binglike

Can kill 77% wettable powder  
25% wettable powder frost spirit.

### 2.2 Varieties Tested

Improved. 3 jing yi.

### 2.3 Field Efficacy Trials

Test for eight processing are:

Processing 1: binglike 200 times liquid  
Treatment 2: binglike 250 times liquid  
Deal with 3: binglike 300 times liquid  
Deal with 4: binglike 350 times liquid  
Deal with 5: binglike 400 times liquid  
800 times liquid treatment and can kill 7%  
Processing after % armor frost spirit 500 times liquid  
Deal with 8: blank control

Each processing repeat 3 times, random, each district covers an area of 15 m<sup>2</sup>.

Choose fertility uniform plot seeding in early August, and then separately spray inoculation in the Chinese cabbage soft rot bacteria, downy mildew disease naturally. For early onset, the field efficacy trials, drug spray according to processing requirements, spray once every seven days, spraying, three times 7 days and 14 days after spraying the survey, the survey records the onset of disease strains and disease severity, and calculate the disease index and relative control effect.

Soft rot disease classification standard for grade 9:

Level 0: vaccination point without infection diseases;

Level 1: disease spot just began to form, water shaped;

Level 3: the disease spot has been produced and length less than 1 cm;

Level 5: disease spot less than 2 cm length is greater than 1 cm;

Level 7: disease spot length is greater than 2 cm;

Level 9: petiole most or all of the decay [9].

Downy mildew disease classification standard for 10,

0 level without disease spot

L external blade has a small amount of disease spot

Level 2 part of the blade with a small amount of disease spot

Level 3 external blades have the majority of disease spot, but I don't

Level 4 external blades have the majority of disease spot, a few leaf disease spot piece

Level 5 external blade has a large number of disease spot, part of the blade slices

Level 6 most sick leaf spot, most disease spot piece

Level 7 most sick leaf spot, disease spot piece and dry

Level 8 most of the blade die

Level 9 most blade or whole plant die, into a serious production

$$\text{Controleffect\%} = \frac{CK - PT}{CK} \times 100\%$$

CK - blank control area after applying pesticide disease index.

PT - processing area after applying pesticide disease index [10].

After harvest measurement cabbage single gross weight, net weight, and calculate the theoretical area yield.

### 3 The Results and Analysis

#### 3.1 Disease Control Effect of Chinese Cabbage Soft Rot

From Table 1 shows that 7 days after spraying, binglike 200 times, 250 times liquid, 300 times 400 times, 350 times liquid, liquid control effects were 65.1%, 71.3%, 78.2%, 86.0%, 52.0%, 77% contrast agents can kill 800 times liquid control effect of 40.0%. Statistical analysis results show that binglike 200 times 300 times, 250 times liquid, liquid, 350 times, 400 times liquid, 77% can kill 800 times liquid of prevention and treatment effect is significantly higher than that of ck. Binglike 200 times, 250 times liquid, and 300 times 400 times, 350 times liquid, liquid control effects were significantly higher than the control effect of 77% can kill 800 times liquid. Binglike 350 times liquid significantly than binglike 200 times liquid, 250 times 400 times, 300 times liquid, liquid control effect is good. Binglike 250 times and 300 times liquid of prevention and control effect is not significant difference. 14 days after spraying, binglike 200 times 300 times, 250 times liquid, liquid is 400 times, 350 times liquid, liquid control effect were 47.9%, 60.9%, 67.5%, 79.7%, 55.1%, 77% contrast agents can kill 800 times liquid control effect of 35.2%. Statistic analysis showed that binglike 200 times 300 times, 250 times

**Table 1.** Disease control effect of Chinese cabbage soft rot

To deal with	After 7 days		Significance of difference		After 14 days		Significance of difference	
	Disease index	Control effect %	0.05	0.01	Disease index	Control effect %	0.05	0.01
4	1.04	86.0	a	A	2.43	79.7	a	A
3	1.97	78.2	b	B	3.78	67.5	b	B
2	2.41	71.3	b	B	4.24	60.9	b	B
1	3.51	65.1	c	C	5.96	47.9	d	D
5	4.03	52.0	d	D	4.98	55.1	c	C
6	4.91	40.0	e	E	6.84	35.2	e	E
8	8.90	—	f	F	12.01	—	f	F

liquid, liquid, 350 times, 400 times liquid, 77% can kill 800 times liquid of prevention and treatment effect is significantly higher than that of ck. Binglike 350 times, 300 times liquid, and 200 times 400 times, 250 times liquid, liquid control effects were significantly higher than 77% can kill 800 times liquid control effect. Binglike 350 times liquid control effect is significantly higher than binglike 200 times liquid, and 250 times 400 times, 300 times liquid, liquid control effects. Binglike 300 times 250 times liquid and binglike fluid control effect has no obvious difference. In short, in all processing, binglike 350 times liquid of Chinese cabbage soft rot the best control effect.

**3.2 Binglike Control Effects of Chinese Cabbage Downy Mildew**

From Table 2, 7 days after spraying, binglike 200 times, 250 times liquid, 300 times 400 times, 350 times liquid, liquid in the control effect of 40.9%, 59.0%, 67.1%, 76.0%, 50.9%, and contrast agent 25% armor frost spirit 500 times liquid of 44.1% control effect. Statistical analysis results show that binglike 200 times 300 times, 250 times liquid, liquid, 350 times, 400 times liquid, 25% armor frost spirit 500 times liquid of prevention and treatment effect is significantly higher than that of ck, binglike 250 times liquid, 300 times 400 times, 350 times liquid, liquid control effects were significantly higher than 25% armor frost spirit 500 times liquid control effect. But binglike 200 times liquid of the control effect was less than 25% armor frost spirit 500 times liquid control effect, the reason is due to the early onset, 200 times binglike processing condition is relatively serious, lead to the processing control effect is not ideal. Binglike 350 times liquid of downy mildew control effect significantly higher than that of binglike 200 times liquid, 250 times 400 times, 300 times liquid, liquid control effects. Spraying, after 14 days for binglike 200 times 300 times, 250 times liquid, liquid is 400 times, 350 times liquid, liquid control effect were 39.5%, 55.3%, 62.8%, 69.9%, 48.0%, 25% contrast agents a frost spirit 500 times liquid of control effect of 40.0%. Statistics analysis shows that binglike 200 times 300 times, 250 times liquid, liquid, 350 times, 400 times liquid, 25% armor frost spirit 500 times liquid of prevention and treatment effect is

**Table 2.** Binglike control effects of Chinese cabbage downy mildew

To deal with	After 7 days		Significance of difference		After 14 days		Significance of difference	
	Disease index	Control effect %	0.05	0.01	Disease index	Control effect %	0.05	0.01
4	3.21	76.0	a	A	4.67	69.9	a	A
3	4.36	67.1	b	B	5.69	62.8	b	B
2	5.40	59.0	c	C	7.09	55.3	c	C
5	5.55	50.9	c	C	7.59	48.0	d	D
7	6.71	44.1	d	D	8.99	40.0	e	E
1	7.09	40.9	e	E	9.33	39.5	e	E
8	13.06	—	f	F	16.02	—	f	F

significantly higher than that of ck. Including binglike 250 times liquid, and 300 times 400 times, 350 times liquid, liquid control effects were significantly higher than the control effect of 25% armor frost spirit 500 times liquid. Binglike 350 times liquid of downy mildew control effect significantly higher than that of binglike 200 times liquid, 250 times 400 times, 300 times liquid, liquid. In short, in all processing, binglike 350 times liquid of Chinese cabbage downy mildew control effect is best.

### 3.3 Impact on Chinese Cabbage Production

The binglike 200 times, 250 times liquid, 300 times 400 times, 350 times liquid, liquid concentration treatment such as Chinese cabbage, on average, single plant yield (kg) were 3.9, 3.96, 4.21, 4.6, 4.5, and 77% can kill 800 times liquid of single tree yield (kg) of 4.1 on average, 25% armor frost spirit 500 times liquid of average single tree yield is 4.2 kg, ck, on average, single plant yield (kg) of 3.82. Statistical analysis results show that binglike 300 times 400 times, 350 times liquid, liquid, can kill 800 times liquid of 77% average single tree production, significantly higher than that of ck average single tree binglike 300 times 400 times, 350 times liquid, liquid 77% significantly higher than the average single tree production can kill 800 times liquid of average single tree production, binglike 200 times, 250 times liquid of average single tree yield compared with the blank control the average single tree production, no significant differences, which may be high concentration binglike adverse influence on the growth of Chinese cabbage. Binglike 350 times, 400 times liquid of 77% average output of single tree can kill 800 times liquid, 25% armor frost spirit 500 times liquid, compared to the average single tree yield difference reached significant level. But binglike 350 times and 400 times liquid of no obvious difference between the average single tree production.

From Table 3 can be concluded that, in the prevention and control of Chinese cabbage soft rot pharmacodynamics, binglike 200 times, 250 times liquid, and 300 times 400 times, 350 times liquid, liquid processing theory of cabbage area yield (kg) of 5917.62, 6413.87, 6811.40, 7263.63, 6711.35, and 77% can kill 800 times liquid of the theory of

**Table 3.** Binglike effects on Chinese cabbage production

To deal with	A single processing flat	667 m <sup>2</sup>	Significance of difference	
	Yield (kg)	Yield (kg)	0.05	0.01
4	54.45	7263.63	a	A
3	51.06	6811.4	b	B
5	50.31	6711.35	c	C
2	48.08	6413.87	d	D
6	46.24	6168.42	e	E
1	44.36	5917.62	e	E
8	44.03	5873.6	f	F

area yield (kg) of 6168.42, blank control theory of area yield (kg) of 5873.60. Statistical analysis results show that binglike 200 times 300 times, 250 times liquid, liquid, 350 times, 400 times liquid, 77% can kill 800 times liquid of the theory of area yield compared with the blank control theory of area yield very significant differences. Binglike 350 times liquid, 300 times 250 times, 400 times liquid, liquid theory of area yield significantly higher than the 77% area yield can kill 800 times liquid of theory, the area yield the highest at 350 times liquid binglike theory. Table 3 shows that binglike 350 times liquid can effectively promote the growth of Chinese cabbage, but when the concentration is on the high side, will have an unfavorable influence on the growth of Chinese cabbage.

It can be concluded from Table 4, in prevention and treatment of Chinese cabbage downy mildew efficacy trials, binglike 200 times, 250 times liquid, and 300 times 400 times, 350 times liquid, liquid of the theory of area yield (kg) were 6031.01, 6140.40, 6895.45, 7204.93, 6636.65, and 25% armor frost spirit 500 times liquid of theory of area yield (kg) of 6465.90, blank control theory of area yield (kg) of 5885.61. Statistical analysis results show that binglike 350 times 400 times, 300 times liquid, liquid, 25%

**Table 4.** Binglike effects on Chinese cabbage production

To deal with	A single processing flat	667 m <sup>2</sup>	Significance of difference	
	Yield (kg)	Yield (kg)	0.05	0.01
4	54.01	7204.93	a	A
3	51.69	6895.45	b	B
5	49.75	6636.65	c	C
7	48.47	6465.9	d	D
2	46.03	6140.4	e	E
1	45.21	6031.01	e	E
8	44.12	5885.61	f	F

armor frost spirit 500 times liquid, liquid binglike 250 times, 200 times liquid of the theory of area yield compared with the blank control theory of area yield very significant differences. Binglike 350 times 400 times, 300 times liquid, liquid theory of area yield and 25% armor frost spirit 500 times liquid extremely significant difference compared with the theory of area yield. With binglike 350 times liquid of the theory of area yield the highest, while binglike 200 times and 250 times liquid of the theory of area yield is low, which further shows that binglike 350 times liquid is suitable concentration.

## 4 Conclusion

Through field test can be concluded that binglike 200 times 300 times, 250 times liquid, liquid, 350 times, 400 times liquid, 77% can kill 800 times liquid, Chinese cabbage soft rot have better effect. One of the most ideal control effect is binglike 350 times liquid, and control effect is significantly higher than 77% can kill 800 times liquid. Of Chinese cabbage downy mildew binglike as field efficacy test as you can see, binglike 350 times liquid, the effect of Chinese cabbage downy mildew is also the most ideal.

## 5 Discussion

In addition, because binglike containing copper, zinc and other trace elements, used in suitable concentration can promote plant growth, increase production of Chinese cabbage. Experiment we found that binglike 350 times, 300 times liquid handling cabbage plant leaf color thick green plants in the area of a robust, growing well. Binglike not only has the prevention effect on the cabbage, but also has certain effect of promoting growth. Binglike belongs to consider disease protective agent, recommend or incipient stage using the ideal at the early stage of the disease occurs, with a 350 times liquid concentration is most appropriate.

Through field test, further defined the binglike prevention of increasing production effect. Provides the theoretical foundation for the application of binglike.

## References

1. R.H. Chen, Y. Hua, J.H. Wang, (2017) Shanghai general research situation and development strategy of Chinese cabbage resources, *Journal of Shanghai agriculture*. 22 (1) 78.
2. W.H. Ma, (2019) Destroy the manganese zinc Chinese cabbage downy mildew prevention and cure effect, *Pesticides*. (6) 27.
3. R.L. Ma, H.T. Wu, (2017) Prevention and control technology of Chinese cabbage soft rot, *China's rural science and technology*. (7) 33.
4. J.G. Dong, (2018) *Agricultural plant pathology*, Beijing: China Agricultural University Press. (5) 5.
5. M.L. Zhang. (2019) *Agricultural plant pathology*, The World Book Publishing Company. (12) 365-368.
6. S. Legg, L.S. Young. (2017) Baotou cabbage with three diseases prevention, *Jilin Vegetables*. (25) 22.

7. C.Q. Wang, (2017) Chinese cabbage disease harmless comprehensive prevention and control technology, Science and technology of shihezi. (23)73-82.
8. B.K.G. Zhang, C.H. Wang, (2019) Chinese cabbage soft rot resistance vaccination identification method of preliminary, Mountain East of Agricultural Science.(5) 39-40.
9. P.S. Li, W. Zhao, Q.W. Li, (2018) Spring to light dishes than experiment, Jilin Vegetables. (18) 252-266.
10. W.L.Wang,(2017)5% of its 2 bacteria ester suspending agent cucumber powdery mildew of field efficacy trials, Pesticide science and management. (12)21.

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