



The prevention and control measures for defoliation diseases of flue-cured tobacco G80 in Hunan province

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Abstract: G80 is a characteristic variety of flue-cured tobacco in Changsha. However, defoliation disease limits popularization and application of the G80 varieties. Here, some prevention and control measures for defoliation diseases were analyzed. The protective agents 1 and 3 can effectively reduce the incidence of the defoliation disease. Smearing protective agents 1 is a time-consuming work, so it is not adaptive for agricultural field production. Therefore, we suggest that protective agents 3 can be used for controlling defoliation diseases of G80. In addition, it was also found that spraying boron fertilizer can reduce the defoliation disease of G80.

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Keywords: defoliation disease, G80, protective agents, boron fertilizer, tobacco production

1. Introduction

Flue-cured tobacco cultivar G80 is a characteristic variety in Changsha. Because its leaf structure is meticulous, the nitrogen compounds cannot be accumulated in leaves, and output of carbohydrates can be decreased. Therefore, the leaf of G80 have thick color and abundant oily, and the average price and proportion of the superior leaf is higher than other varieties^[1]. It had been showed that the appearance quality of the upper and middle leaves in G80 is higher than K326, that the content of total sugar and reducing sugar in the upper leaves of G80 is lower than K326, and that the content of total sugar and reducing sugar in the middle and lower leaves of G80 is higher than K326^[2]. The capacious leaf of G80 can provide enough area for photosynthesis, therefore, tobacco plant can rapidly grow. It is helpful to reduce stem ratio of tobacco leaf, which can improve the integrity and filling performance of tobacco cut. Over the years, the phenomenon of leaf defoliation often appears in G80 cultivation and seriously decrease the yield and quality of tobacco leaves. Therefore, popularization and application of the G80 varieties is limited.

Our pervious results showed that fungal infection is an outer inducing factor, and the low cellulose content, low synthetic ability of xylan and pectin, the low removal ability of abnormal protein and low immune responsiveness are the inner reason for defoliation of flue-cured tobacco G80^[3]. Since G80 is

indispensable raw material for Baisha series cigarette produced by Hunan Industrial Corporation, G80 was planted for a certain area in Hunan province every year. Therefore, it is necessary to put forward prevention and control measures for defoliation diseases of flue-cured tobacco G80 in Hunan province.

2. Material and Methods

2.1 Plant material and treatment

The flue-cured tobacco variety of K326 and G80 were grown in Hunan liuyangshashi town, and conventional field managements were carried out. The bud inhibitors were used or not used after topping. There are six treatments including CK (control, conventional field managements), T1 (No suckercides), T2 (smearing protective agents 1 before smearing suckercides), T3 (smearing protective agents 1 after smearing suckercides), T4 (spraying protective agents 2 at two weeks after topping), T5 (spraying protective agents 3 at two weeks after topping), T6 (spraying boron fertilizer).

2.2 The observation of tobacco main veins structure

During the period of defoliation disease, the main veins of upper leaves were sampled for scanning electron microscopy (sem) to observe the transverse structure of main veins with the method in Zhang⁴ paper^[4].

2.3 Cellulose content determination of tobacco main veins

The main veins were sampled every 10 days after topping. The samples were selected through 100 mesh sieve after dried and crushed. Each treatment was detected for three biological repetitions. The cellulose content was determined with wang's method [5].

3. Results

3.1 The effect of protective agents on leaf defoliation

In order to screen prevention and control measures for defoliation disease of flue-cured tobacco G80, diverse protective agents were used in G80 cultivation. As shown in table 1, the rate of defoliation in the two treatments of protective agents 1 and 3 was obviously lower than the control, showing that protective agents 1 and 3 can effectively control the defoliation disease. In all treatments of protective agents, the rate of defoliation in the treatment of protective agents 1 used after smearing suckercides was the lowest. The rate of defoliation in the treatment without suckercides is markedly lower than the control, indicating that the use of suckercides is an important inducement for defoliation disease of G80.

The cellulose can increase the toughness of the plant tissue. The cellulose content in leaf stalk was showed in figure 1. The cellulose contents in the two treatments of protective agents 1 and no suckercides were higher than the control and other treatments, which was consistent with the results on the rate of defoliation. Therefore, the cellulose content in leaf stalk was related to defoliation disease of G80.

The organization structures of the tobacco petiole were shown in figure 2. There was a large amount of mycelium in the epidermal cells of the G80 petiole, and there was a small number of mycelium in the epidermal cells of the G80 petiole treated with protective agents 2. However, there was no mycelium

in the three treatments of protective agents 1 and 3, and the same results were also found in the treatment without suckercides. These results showed that the protective agents 1 and 3 can prevent the invasion of pathogenic bacteria.

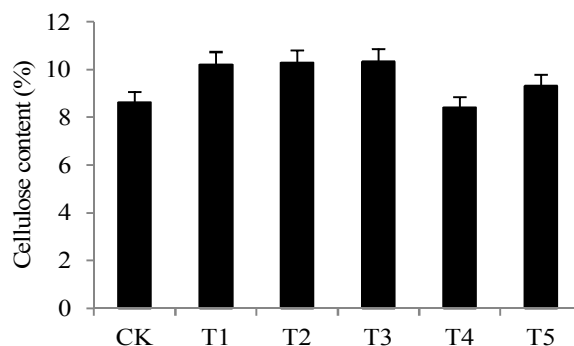
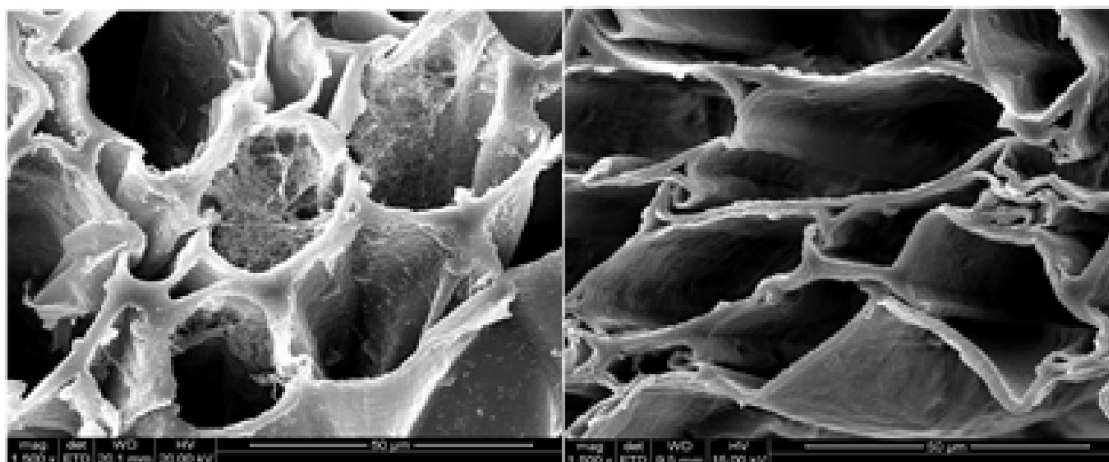


Figure 1 The effect of protective agents on the cellulose content in leaf stalk

3.2 The effect of spraying boron fertilizer on leaf defoliation

It is well known that Boron element is involved in the formation of plant cell walls. After boron fertilizer was sprayed, the rate of defoliation was markedly lower than the control, but higher than that in the treatment without suckercides. As shown in Fig. 3, the cellulose content in leaf stalk in the treatment with boron fertilizer was higher than the control. These results showed that boron fertilizer can promote the formation of plant cellulose, and then improve the toughness of the petiole. Therefore, spraying boron fertilizer can reduce the defoliation disease of G80.



CK

T1

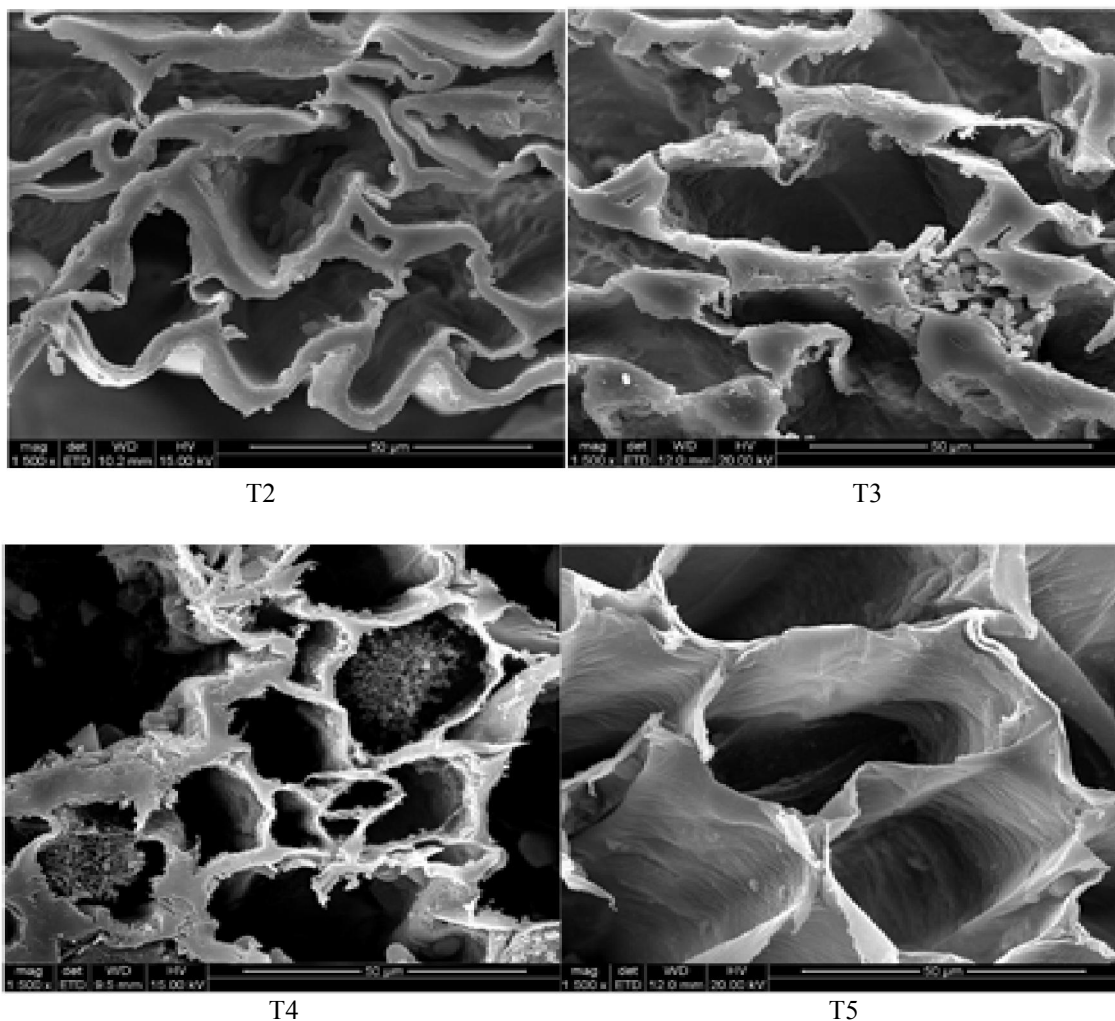


Figure 2 The effect of protective agents on the organization structures of the tobacco petiole

Table 1 The effect of protective agents on leaf defoliation

Date	CK	T1	T2	T3	T4	T5
6.16	1.69(2/118)	0.76(1/131)	0(0/132)	0(0/125)	0(0/120)	0(0/119)
6.22	5.71(6/105)	2.54(3/118)	3.28(4/122)	0(0/119)	6.19(7/113)	3.70(4/108)
7.03	5.69(12/211)	0.05(6/120)	5.88(7/119)	1.71(2/117)	5.39(13/241)	3.64(8/220)
7.05	7.28(39/536)	2.25(12/534)	4.05(21/518)	3.88(20/516)	10.76(55/511)	7.49(42/561)
7.11	3.27(7/213)	1.88(4/213)	2.35(5/518)	0.93(2/214)	3.64(8/220)	2.35(5/213)
Total	5.58(66/1183)	2.33(36/1116)	3.35(37/1104)	2.20(24/1091)	6.89(83/1205)	4.83(59/1221)

Table 2 The effect of spraying boron fertilizer on leaf defoliation

Date	CK	T1	T6
6.16	1.72(1/58)	0.76(1/131)	0.85(1/117)
6.22	9.62(6/52)	2.54(3/118)	5.36(6/112)
7.03	8.18(9/110)	0.05(6/120)	5.13(12/234)
7.05	12.84(33/257)	2.25(12/534)	6.58(35/532)
7.11	5.71(6/105)	1.88(4/213)	3.24(7/216)
Total	8.42(49/582)	2.33(36/1116)	5.04(61/1211)

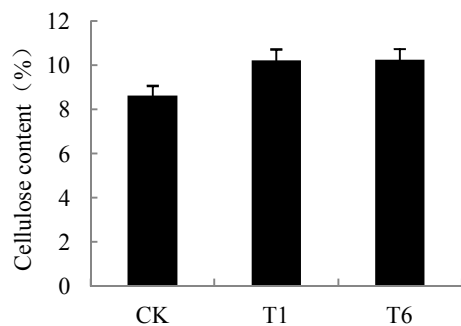


Figure 3 The effect of spraying boron fertilizer on the cellulose content in leaf stalk

4. Discussion

Our previous work had found that the defoliation of flue-cured tobacco G80 was attribute to the wet weather and the variety's own characteristics. Therefore, some prevention and control measures for defoliation diseases were screened in this paper. The protective agents 1, 2 and 3 were developed according to the reason for the defoliation of flue-cured tobacco G80. The protective agents 1 and 3 can effectively reduce the incidence of the defoliation disease. In all treatments of protective agents, the rate of defoliation in the treatment of protective agents 1 used after smearing suckercides was the lowest. However, smearing protective agents 1 is a time-consuming work, so it is not adaptive for agricultural field production. Therefore, we suggest that protective agents 3 can be used for controlling defoliation diseases of G80. In addition, it was also found that spraying boron fertilizer can reduce the defoliation disease of G80.

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