Study on the effects of different soil types and tobacco varieties on the incidence of tobacco wilt disease

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INTRODUCTION

Tobacco wilt disease is soil-born disease caused by *Ralstonia solanacearum*, which occurs in temperate and subtropical major tobacco-producing region. In order to study the effect of different soil types and tobacco varieties on the incidence of tobacco wilt disease, a higher concentration of gradient dilution($1.0\times10^{5\text{-}9}$ CFU/mL) of *Ralstonia solanacearum* was used to inoculated to K326 and Yunyan 87 varieties(Resistance:K326>Yunyan87) with irrigation method, which is grown in paddy soil, fluvo-aquic soil, purple soil and red soil, respectively. The effect of pathogen amount, soil type and varieties on the incidence of tobacco wilt disease were investigated.

METHODS AND RESULTS

- Materials:
  Nicotiana tabacum Yunyan 87, K326 and Ralstonia solanacearum strains.
- Methods:
  The quantification of *Ralstonia solanacearum* in fields were performed by using sybgreen realtime PCR.
  The isolation of *Ralstonia solanacearum* from tobacco stem was using NA plates containing TTC.
  Induction of bacterial wilt disease in K326 and Yunyan 87 was using root irrigation method.

Table 1 The realtime PCR quantification of *Ralstonia solanacearum* in fields

Order of magnitude in pathogen abundance	The amount of fields	Ratio to total fields
10E6	5	1.42%
10E5	26	7.39%
10E4	25	7.10%
10E3	19	5.40%
Less than 10E3	40	11.36%
None	236	67.05%

Fig. 1 The strains growig on the NA plates containing TTC

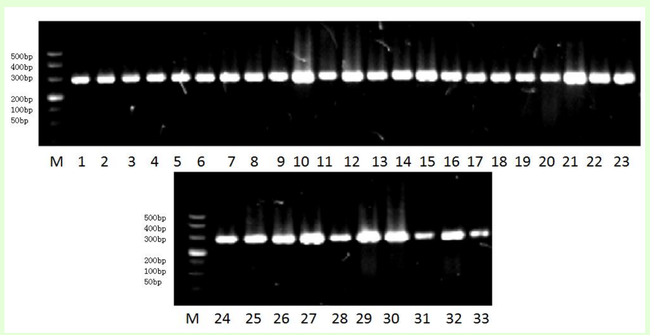

Fig. 2 Species identification by using PCR with primer pair 759/760 M：DL500 marker， 1-33：isolated strains

Fig.3 The 16S rRNA sequence of isolated strains

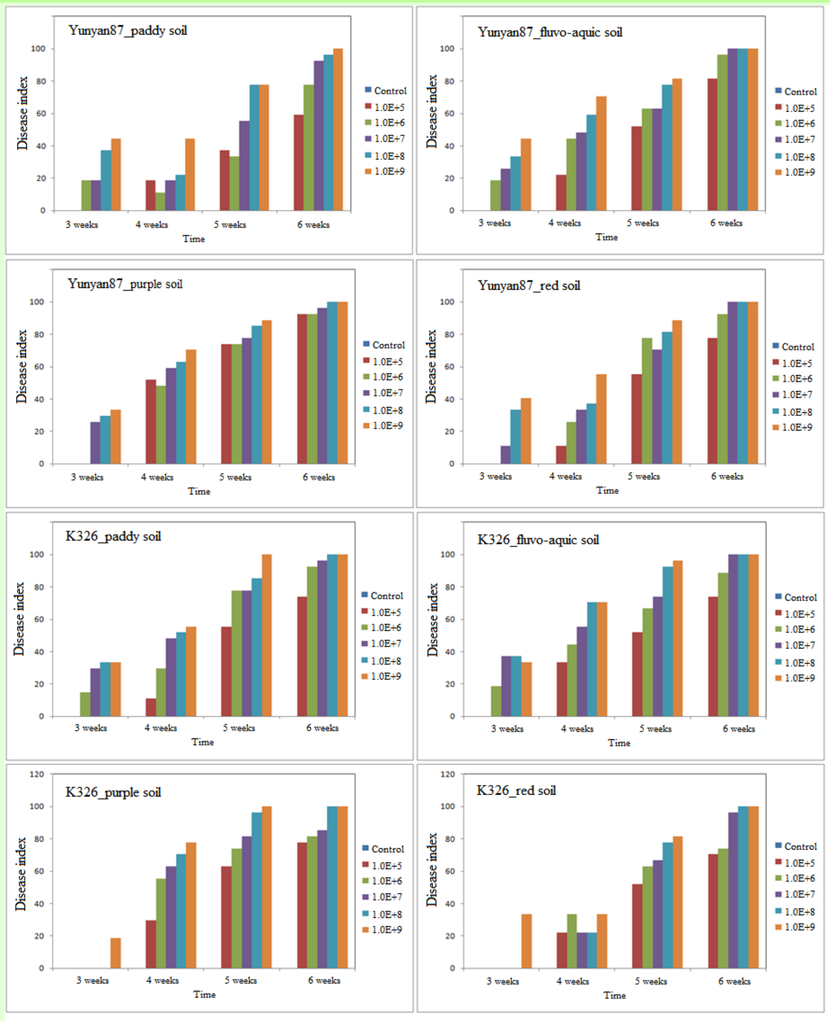

Fig.4 The effect of pathogen with different concentrations on the disease incidence of K326 and Yunyan 87 growing in paddy soil, aquic soil, purple soil and red soil

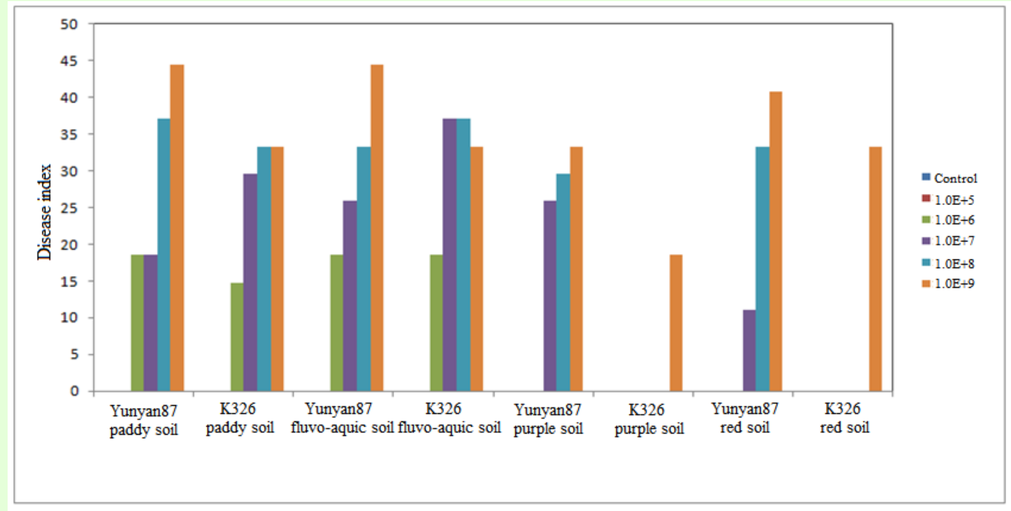

Fig. 5 The disease incidence of K326 and Yunyan 87 after root irrigation with pathogen for 3 weeks

CONCLUSIONS

A total of 352 fields were measured, of which 116 were detected with the pathogen, 236 were not detected, 75 fields with the pathogen in 10E3 order of magnitude were accounted for 21.31% of the total measured fields. The wilt disease incidence is lowest in 1.0×10^{5}CFU/mL dose inoculation and highest in 1.0×10^{9} CFU/mL dose treatment. Yunyan 87 grown in paddy soil and fluvo-aquic soil was wilted with disease index above 10 in 3 weeks after 1.0×10^{6}CFU/mL dose treatment, although 1.0×10^{7}CFU/mL dose treatment with 3 weeks could result in 10 and 25 in disease index when Yunyan 87 planting in purple soil and red soil, respectively. For K326, only 1.0×10^{9}CFU/mL dose with 3 weeks treatment could induce wilt to K326 grown in purple soil and red soil, other concentration couldn't cause disease at 3 weeks, the pathogen with 1.0×10^{6}CFU/mL concentration and more could result in wilt disease after 4 weeks of treatment, and 1.0×10^{5}CFU/mL concentration can cause disease after 5 weeks. The results showed that the combination of soil type and tobacco varieties could prevent the occurrence and development of bacterial wilt disease.