

2021臺灣國際蘭花研討會蘭科植物科技研發成果發表

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技術/專利：緩草之非農藥資材病害防治與遮陰處理對其生育之影響

technology/patent: Effects of Non-pesticide Materials on Controlling Diseases and Shading on the Growth of *Spiranthes sinensis* (Pers.) Ames

sinensis (Pers.) Ames

研發機關：行政院農業委員會花蓮區農業改良場

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摘要 Abstract

緩草植株在秋冬季節高濕的環境，常發生葉斑病等病害，對植株生育影響甚大，本研究以亞磷酸、水楊酸等非農藥資材探討其對緩草病害之防治效果。緩草組培苗自2月底馴化出瓶後，開始監測其罹病情形。調查顯示緩草罹病程度自11月起快速上升，至隔年2月開花初期，對照組罹病率最高達51.3%，而利用亞磷酸中和水溶液及水楊酸處理有明顯降低病害發生效果，罹病率10%以下，惟水楊酸處理易有藥害發生，造成葉片黃化；以葉施或澆灌木黴菌或枯草桿菌處理對病害防治效果不彰，但有促進緩草生育之效果，顯著提高地上部及地下部生長及開花，單株組培苗經栽培1年後，調查結果顯示其芽數可達5.07-6.07芽，鮮重達11.4-14.4g，顯著優於對照組之4.10芽、8.4g。另於夏秋季測試不同遮陰網搭配遮兩棚之緩草生育情形，並以可調節遮陰之網室為對照。遮陰網處理除可調節光照外，並有助於降低環境溫度。網室處理於夏季7-9月調節遮陰達66%，緩草之地上部生育情形最好，葉片長度最長，其次依序為遮陰53%黑網，遮陰44%白網、遮陰27%綠網處理，並以無遮陰處理葉片最短，故隨遮陰程度越高，緩草葉長明顯越長；根部生育方面，仍以網室處理最佳，而戶外試驗地各遮陰處理間無顯著差異；鮮重調查結果與根部呈相同趨勢。

Spiranthes sinensis (Per.) Ames is prone to diseases and often grow poorly in humid environment during autumn and winter. This study investigated the efficacy of non-pesticide materials in controlling diseases of *Spiranthes sinensis* (Pers.) Ames. During the experiment, diseases occurred continuously once the plantlets were planted since the end of February. Incidence of disease increased rapidly in November, and peaked at 51.3% at early flowering stage. Neutralized phosphorous acid solution and salicylic acid treatments significantly reduced the disease severity to below 10%. However, the salicylic acid treatment caused chemical damage to plants, resulting in yellow leaves. Both *Trichoderma* spp. and *Bacillus subtilis* treatments of either spray or irrigation treated failed to control plant diseases effectively, but promoted plant growth and development significantly, increased growth rate of leaf, root and flowering was observed. After 1 year of cultivation, the plantlets of *Trichoderma* spp. and *Bacillus subtilis* treatments grew 5.07-6.07 shoots, and 11.4-14.4 g in fresh weight, both greater than the plantlets of control treatment which grew 4.10 shoots and 8.4 g in fresh weight. Furthermore, the study was comparison on the growth of *Spiranthes sinensis* (Pers.) Ames at different shading net with rain shelter in outdoor test site, and contrast with flexible shading in shading-nets. Using shading net treatments not only adjusted the environment's light intensity, but also reduced the temperature. The plantlets grew best in shading-nets, the shading ratio was up to 66% from July to September. The leaf length results showed that the shading-nets treatment was the longest one than others, and followed by 53% shading black net, 44% shading white net, 27% shading green net, and non-shaded treatment was the shortest one. The leaf length was longer as shading ratio was higher. The roots grew best in shading-nets treatment. The growth of roots were no significant difference among the treatments of outdoor test site. The plant weight results showed the same trend with the root growth.

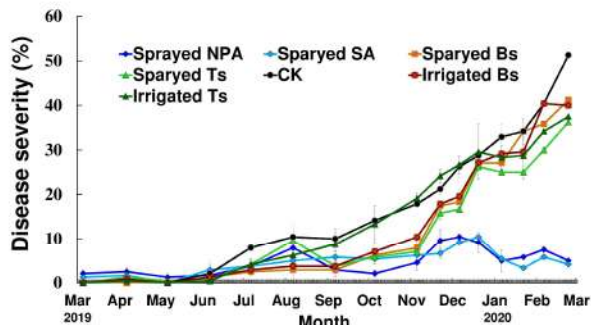


圖1. 亞磷酸(NPA)、水楊酸(SA)、枯草桿菌(Bs)及木黴菌(Ts)處理對緩草罹病度之影響。
Fig. 1. Effects of Neutralized phosphorous acid solution (NPA), salicylic acid (SA), *Bacillus subtilis* (Bs) and *Trichoderma* spp. (Ts) treatments on disease severity of *Spiranthes sinensis* (Pers.) Ames.

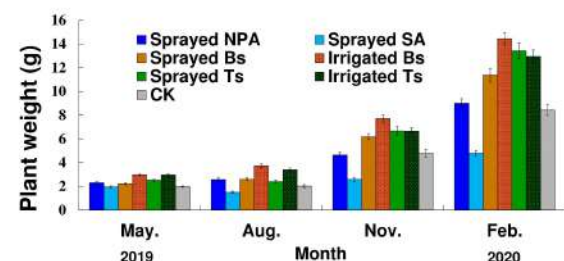


圖3. 亞磷酸(NPA)、水楊酸(SA)、枯草桿菌(Bs)及木黴菌(Ts)處理對緩草鮮重之影響。
Fig. 3. Effects of Neutralized phosphorous acid solution (NPA), salicylic acid (SA), *Bacillus subtilis* (Bs) and *Trichoderma* spp. (Ts) treatments on plant weight of *Spiranthes sinensis* (Pers.) Ames.

圖表 Figure & Table



圖2. 亞磷酸及水楊酸處理抑制病害發生。亞磷酸處理(A)、水楊酸處理(B)、對照組(C)。

Fig. 2. Neutralized phosphorous acid solution and salicylic acid treatments significantly reduced the disease incidence of *Spiranthes sinensis* (Pers.) Ames.



圖5. 夏秋季不同遮陰處理，緩草生育狀況。

Fig. 5. The growth of *Spiranthes sinensis* (Per.) Ames on Shading treatments in summer, autumn season. B: Black net (49% shade), W: White net (39% shade), G: Green net (16% shade), O: No shade, S: Shading-nets (flexible shade).

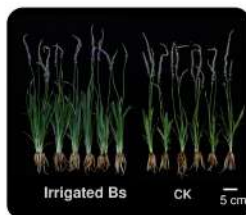


圖4. 澆灌枯草桿菌處理有助於緩草生長發育，並且開花情形更為茂盛。

Fig. 4. *Spiranthes sinensis* (Pers.) Ames grew and bloomed better by irrigating *Bacillus subtilis* solution.

表1. 夏秋季不同遮陰處理對緩草生育之影響。

Table 1. Effects of Shading treatments on plant growth of *Spiranthes sinensis* (Pers.) Ames in summer, autumn season.

Shading ^z	No. of shoot (no. per cluster)	No. of leaves (no. per cluster)	No. of roots (no. per cluster)	Shoot length (cm)	Root length (cm)	Plant weight (g per cluster)
B ^y	1.90±0.00 b ^x	8.17±0.70 c	6.43±0.61 b	8.15±0.44 b	6.22±0.30 b	1.74±0.08 b
W	1.87±0.57 b	7.87±1.67 c	7.03±1.10 ab	8.09±0.07 b	6.54±1.01 ab	1.68±0.12 b
G	1.73±0.25 b	8.73±0.90 bc	7.10±0.17 ab	7.08±0.83 c	6.04±0.48 b	1.84±0.24 b
O	2.43±0.38 a	9.93±0.61 ab	6.57±0.57 b	5.19±1.33 d	6.31±0.49 ab	1.76±0.01 b
S	1.73±0.84 b	10.90±2.95 a	7.73±1.54 a	11.10±2.90 a	6.79±0.35 a	2.69±0.47 a

^z Experiment Time: 2018/05/14-2018/11/12.

^y B: Black net (53% shade), W: White net (44% shade), G: Green net (27% shade), O: No shade, S: Shading-nets (flexible shade).

^x Data are expressed as the mean ± standard deviation. Mean separation within columns by LSD test at P<0.05 level.