



芋健康組織培養種苗生產模式之研究

Study on the Production Mode of Taro Healthy Tissue Culture Seedlings

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芋(*Colocasia esculenta*)為臺灣重要之根莖類蔬菜，芋種苗繁殖係經由前作之走莖或分株等量化種苗方法為主，由於栽培期間容易受到疫病、白絹病、軟腐病等土傳性病原感染，加上多數產區植株已有病毒病害感染，經檢測各地區病毒檢出率達33.3~89.6%(表1)，主要之病毒病害為芋頭嵌紋病毒*Dasheen mosaic virus*, DsMV。為避免長久下來走莖或分株種苗帶病問題漸趨嚴重，影響芋產量和品質的穩定，本場應用組織培養和病毒檢測技術，建立芋無特定病原組織培養健康種苗生產流程(圖1)，並與臺中市大安區農會輔導之農民合作，進行健康種芋的生產模式開發。

本研究比較出瓶2個月之健康組培種苗與農民自留種種苗之生長，兩者於田間定植6個月後之株高、葉長和葉寬(表2、圖2左)以及栽培1年後收穫之球莖(表3、圖2右)生長表現皆無顯著差異，顯示組培苗直接應用於田間栽培可收穫正常球莖，僅組培苗有較高比例產生叢生芽為其缺點。以篩選過之組培2代苗種植，則可減少叢生芽發生情形，且較自留種種苗降低田間補植率約3倍(結果未顯示)，有效改善栽培管理成本與提高產量收益。

Taro (*Colocasia esculenta*) is an important root vegetable in Taiwan. The taro seedlings are propagated mainly by stolons of the mother plants. However, taro is susceptible to soil-borne pathogens such as blight, southern blight, and soft rot during cultivation. In addition, most plants in production areas were infected with viral diseases, especially *Dasheen mosaic virus* (DsMV). The virus detection rate was 33.3-89.6% (Table 1). In order to avoid the increasingly serious problem caused by disease-infected seedlings, which affects the stability of taro yield and quality, we establish a tissue culture seedling production process combined with multi-virus detection technologies for taro specific pathogens-free (SPF) seedlings production (Figure 1). We cooperate with Taichung City Daan District Farmers Association to develop the production mode of healthy taro seedling.

This study compared the growth performance of tissue-culture SPF seedlings and stolon-seedlings kept by farmers, the results of year 2021 showed that there were no significant difference in plant height, leaf length and leaf width (Table 2, Figure 2 left) and harvested corms (Table 3, Figure 2 right). This means that healthy seedlings from tissue culture can be used directly for field cultivation and the corms are harvested normally. The only disadvantage is that the branching rate of tissue-cultured seedlings is higher. We further use the 2nd generation seedlings to planting, which can reduce the branching rate. Because of the better quality of healthy taro seedlings compared with stolon-seedlings kept by farmers, the replanting rate was reduced by about 3 times (result not shown), which effectively reduces the cultivation cost and improves the corm yield.

表1. 國內芋主要產區之病毒檢出率

Table 1. The virus detection rate in major taro producing areas in Taiwan

Area	Sample No.(fields No.)	Virus detection rate (%)	
		DsMV	DsMV+CMV
苗栗 Miaoli	16(3)	89.6±10.0 a	0.0±0.0 a
台中 Taichung	24(4)	33.3±06.7 b	0.0±0.0 a
高雄 Kaohsiung	37(3)	76.0±22.8 ab	2.8±4.8 a
花蓮 Hualien	13(3)	61.1±34.7 ab	0.0±0.0 a
金門 Kinmen	16(3)	85.6±17.1 a	0.0±0.0 a

*Data are expressed as mean ± standard deviation. Significantly different at the 0.05 level according to Least Significant Difference (LSD) test.

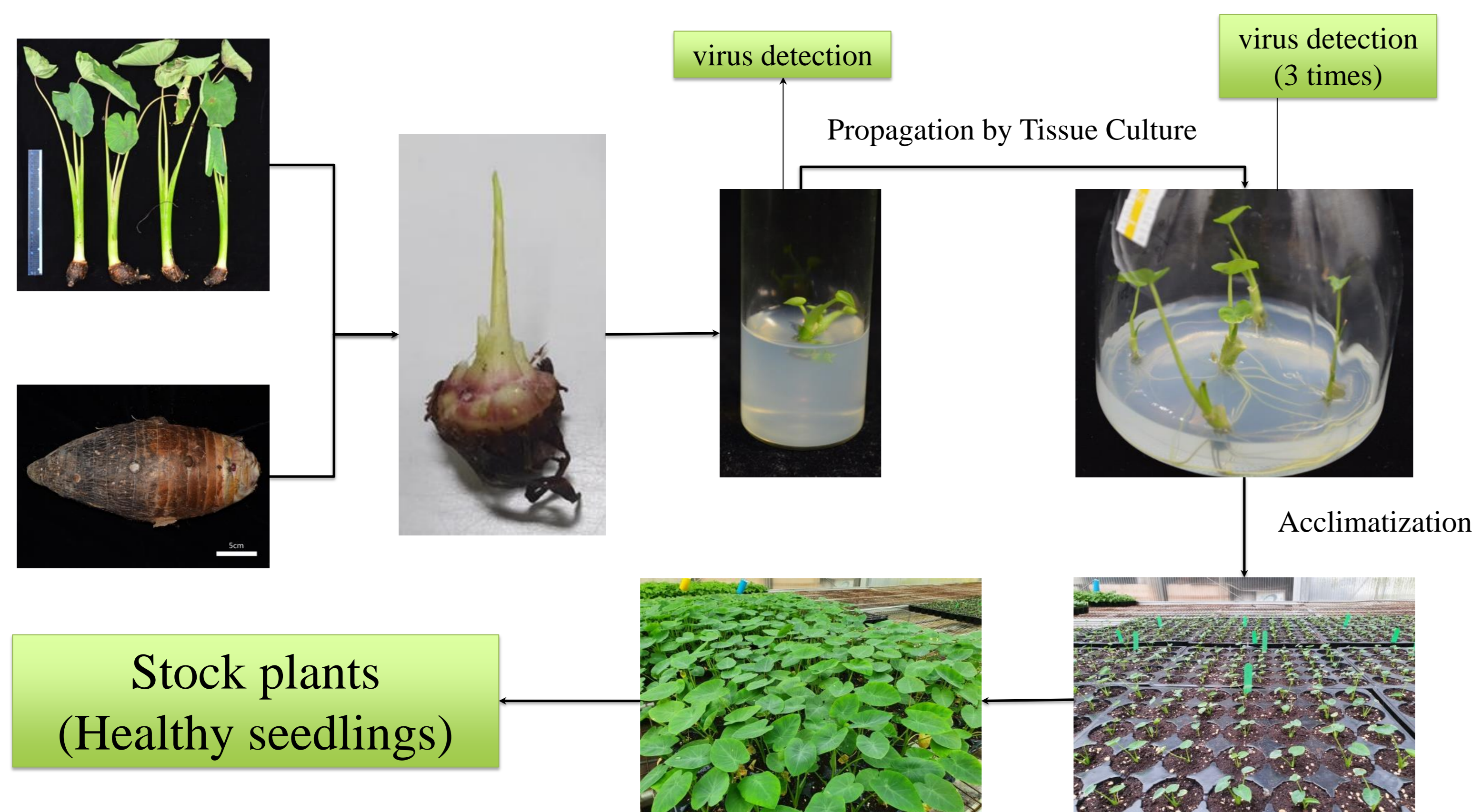


圖1. 芋健康組織培養種苗生產流程

Figure 1. Production process of taro specific pathogen-free healthy seedlings (Virus detection including: DsMV, TuMV, CMV, ZaMV and ZaMMV)

表2. 比較芋組織培養苗與自留種苗於田間定植6個月之生育表現

Table 2. Comparison of the growth performance of healthy taro tissue culture seedlings and stolon-seedlings kept by farmers after 6 months of planting

Seedling type	Plant height (cm)	Leaf number (No.)	Leaf length (cm)	Leaf width (cm)	Branching rate (%)
Stolon	112.4± 7.4 a	5.0±0.2 a	42.3±4.1 a	31.6±3.0 a	0.0± 0.0 b
Plantlet	107.2±13.6 a	4.5±0.6 b	38.7±6.1 a	29.1±4.6 a	30.0±47.0 a

*Data are expressed as mean ± standard deviation. Significantly different at the 0.05 level according to Least Significant Difference (LSD) test.

表3. 比較芋組織培養苗與自留種苗之球莖性狀表現

Table 3. Comparison of the corm traits between taro tissue culture healthy seedlings and stolon-seedlings kept by farmers

Seedling type	Corm perimeter (cm)	Corm length (cm)	Corm fresh weight (g)
Stolon	29.9±2.3 a	21.3±2.7 a	838.5±253.4 a
Plantlet	29.3±1.8 a	22.5±2.6 a	866.7±195.2 a

*Data are expressed as mean ± standard deviation. Significantly different at the 0.05 level according to Least Significant Difference (LSD) test.



圖2. 無特定病原芋組織培養健康種苗於田間生長6個月之植株生長表現(左)及栽培1年收穫之球莖(右)。

Figure 2. Plant growth morphology (left) of healthy seedlings grown in the field for 6 months and corm morphology (right) harvested after 1 year of cultivation.