Preservation of Sweet potato (*Ipomoea batatas*) Using Slow growth techniques for Gene bank

P. Sangkasa-ad[1], P. Wongchang[1], S. Bunmanop[1], P. Rukkid[1], P. Sudhishurnark[1], S. Dechakumpoo[1], P. Piriyavinit[1], T. Luangsuphabool[1], K. Pipithsangchan[1] and K. Thammasiri[2].

1 Genebank Research and Development Group, Biotechnology Research and Development Office, Department of Agriculture, Pathumthani, 12110, Thailand;

2 Department of Plant Science, Faculty of Science, Mahidol University, Rama VI Road, Phayathai, Bangkok 10400, Thailand.

Abstract

Sweetpotato [*Ipomoea batatas* (L.) Lam] is an important food crop in Thailand and germplasm conservation mostly in the field. The preservation of plant genetic resources by slow growth technique is a useful method for *In vitro* conservation of sweetpotato genotypes that should be develop to save the important accessions of sweetpotato germplasm for breeding and genebank. Four genotypes were used (PJ265-1, PJ0106-6, PJ65-3 and PJ284-17) that represent in the different pulp color with 3 experiments are induce the concentrations of MS salts (1/2MS, 1/4 MS) and sucrose (30, 60, 90 g/L), using of growth regulator (ABA 0, 2, 4, 6, 8 and 10 mg/L) and using of growth retardants (ancymidol 0, 5, 10, 15 and 20 µM). The survival (%) was evaluated every three months, the four genotypes of sweet potato was obtained over nine months by using 1/2MS medium plus 30 mg/L of sucrose, MS medium plus ABA 2-6 mg/L and MS medium plus ancymidol 10 µM By the way, *In vitro* plantlets should be sub-culture after six months.

Introduction

Sweetpotato (*Ipomoea batatas* L.) is the seventh most important food crop in the world, after wheat, rice, maize, potato, barley and cassava (Rosselet. al., 2008). It is considered to be a rustic tropical vegetable crop with many use. In Thailand, it is grown all over the country, about 95% of production was for human food as desserts, snacks and maindishes and 5% for animal feed (Narin, 1999). Sweetpotato root is a valuable food which has a good source of energy, vitamin and phytonutrient such as anthocyanin beta-carotene antioxidant etc. It was a good chance to be great commercial interest.

Germplasm conservation of sweetpotato in Thailand collected by government agencies and farmers in the field. There was more than 200 accessions has been collected, thus, the *in vitro* maintenance method will be developed to safeguard important accessions form the risk of diseases, climate change and cost occur from field maintenance and it is the best way to exchange germplasm (Suriyan and Chalermpol, 2007). The slow growth *in vitro* conservation technique is the aim of this study to develop the condition for conserved germplasm of sweet potato in Genebank.

Materials and Methods

The four genotypes of sweetpotato (PJ265-1, PJ0106-6, PJ65-3 and PJ284-17) were collected from Phichit Agricultural Research and Development Center, were established *in vitro* in tissue culture room for multiplied plantlet about 6-8 weeks. The nodal segments with one bud each were used in this study.

Experiment I

- The effect of osmotic regulator and salt concentration in MS medium : four genotypes of sweetpotato, two concentration of MS salt (1/2MS, 1/4MS), three concentrations of sucrose (30, 60, 90 g/L)

Experiment II

- The effect of growth regulator (ABA) : four genotypes of sweetpotato, six concentrations of abscisic acid (0, 2, 4, 6, 8 and 10 mg/L)

Experiment III

- The effect of growth retardant (ancymidol) : four genotypes of sweetpotato, five concentrations of ancymidol (0, 5, 10, 15, and 20 µM)

The results were checked every three months : shoot height, viability rating score and the survival evaluation.

Results and Discussion

The effect of Osmotic regulator and salt concentration in MS medium, the half MS salt concentration with 30 g/L of sucrose resulted in shoot height was lower, there was no significant between genotypes (table 1) and found that viability rate shown lowest score (table 2) at nine months (270 days)

The effect of growth regulator (ABA), the concentration of ABA 2-6 mg/L not significant in shoot height and still have the low score of viability rate, subculture interval about nine months (270 days) (Figure 1)

The effect of growth retardant (ancymidol), the concentration of ancymidol at 10 µM shown the shoot height as indicators for slow growth with low viability rate especially genotype PJ010-6. Subculture interval about nine months (270 days) (Figure 2)

Table 1 Shoot height of the sweetpotato at 270 days of *In vitro* conservation of genotype and difference in MS salt and sucrose concentration.

Genotype	Concentration of MS					
	1/2MS			1/4MS		
	sucrose concentration (mg/L)			sucrose concentration (mg/L)		
	30	60	90	30	60	90
PJ0106-6	5.5 a	7.6 a	7.0 a	7.5ab	5.9a	2.6a
PJ284-17	5.2 a	7.4 a	7.4 a	8.4a	6.2a	4.1a
PJ265-1	5.0 a	6.3 a	4.3b	6.1bc	4.7a	2.4a
pJ65-3	4.9 a	7.8 a	4.8b	5.3c	5.7a	2.5a
%cv	35.1%					

Means followed by a common letter are not significantly different at the 5% level by DMRT

Table 2 Viability score of the sweetpotato at 270 days of *In vitro* conservation of genotype and difference in MS salt and sucrose concentration.

Genotype	Concentration of MS					
	1/2MS			1/4MS		
	sucrose concentration (mg/L)			sucrose concentration (mg/L)		
	30	60	90	30	60	90
PJ0106-6	2.6a	3.3b	4.6a	3.4a	4.8a	3.5b
PJ284-17	4.4b	4.5a	4.2a	4.5a	4.6a	4.9a
PJ265-1	2.9b	4.0ab	4.8a	4.2a	4.5a	5.0a
pJ65-3	2.1b	4.6a	5.0a	4.2a	4.3a	4.2ab
%cv	14.49%					

Means followed by a common letter are not significantly different at the 5% level by DMRT

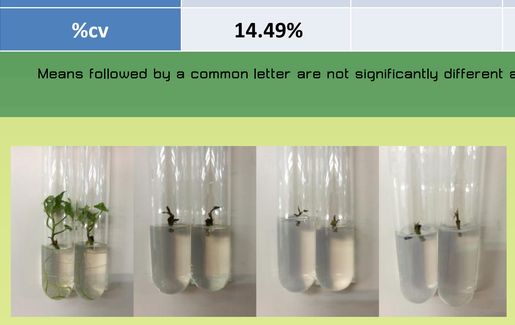

Figure 1

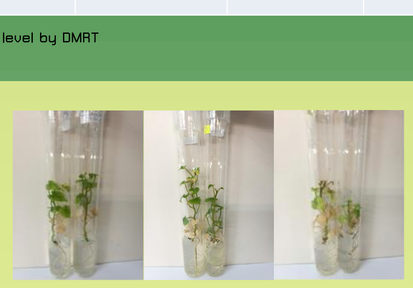

Figure 2

Conclusions

In vitro slow growth preservation technique has been for medium-term conservation in genebank for extension of subculture interval. The four genotypes of sweetpotato (PJ265-1, PJ0106-6, PJ65-3 and PJ284-17) was obtained over nine months or about 270 days by using 1/2MS medium plus 30 mg/L of sucrose, MS medium plus ABA 2-6 mg/L and MS medium plus ancymidol 10 µM The further study need long-term conservation technique as cryopreservation.

Literature cited

Narin Poolperm. 1999. Conservation and Use of Sweetpotato in Thailand. In Conservation and Utilization of Sweetpotato Genetic Diversity in Asia, pp : 53-57.

Rossel G., Espinoza C., Javier M. and Tay D. 2008. Regeneration guidelines : sweetpotato. *In* Dulloo M.E., hormann I., Jorge M.A. and Hanson J., editors. Crop specific regeneration guideline [CD-Rom]. CGIR System wide Genetic Resource Programme, Rome, Italy. 9 pp.

Suriyan Cha-um and Charlermpol Kirdmanee. 2007. Minimal Growth *In vitro* Culture for Presearvation of Plant Species, Fruit, Vegetable and Cereal Science and Biotechnology., pp : 13-25.

Acknowledgement

The authors wish to acknowledge and express thanks to Phichit Agricultural Research and Development Center, DOA Genebank colleagues for kindly help every steps throughout the research.