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Poster:

Study of early screening of potato (*Solanum tuberosum* L.) as a result of drought stress (*in vitro)*

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Abstract.Preliminary studies in Screening of Potato (*Solanum tuberosum* L.) as a result of drought stress (*in vitro)*. This study aim was to determine the limits of potato (*Solanum tuberosum* L.) to drought stress conditions in vitro using PEG. This research was conducted at the Tissue Culture Laboratory Unit / Laboratorium Kultur Jaringan UPT/Balai Benih Induk Hortikultura Dinas Pertanian Propinsi Sumatera Utara, Jl. Karya Jasa No. 6 Gedung Johor Medan in March 2012 to June 2012. The Completely Randomized Design (non factorial) was used with PEG concentrations of five levels, namely: P1 = 10%, P2 = 20%, P3= 30%, P4 = 40% and P5 = 50% with 5 replications. The results showed that increasing the concentration of PEG will reduce the percentage of plantlets survival, reduce plant height, number of roots and number of nodes. Treatment of 50% PEG resulted in the death of potato cuttings due to drought stress.
Keywords: early studies, screening, drought stress

Introduction

Potatoes are one of the alternative commodities that support government programs for food security. In recent years, the need for potatoes is likely to increase and this plant is one of the priority commodity development. Potatoes in Indonesia is used as a source of carbohydrate in the food diversification program. Polyethylene Glycol (PEG) was reported able to hold water so that it becomes not available to plants. The amount of PEG solution to hold water depends on the molecular weight and concentration (Mexal *et al*., 1975), it is soluble in water, not toxic to plants, and is not easily absorbed making PEG as an effective compound to simulate drought conditions (Mullahey *et al*., 1996, Dami & Hughes, 1997, Kaur *et al*. 1998). Selection methods were developed with a solution of PEG to identify potato plants respond to drought stress in vitro, thus might also consistent ex vitro. Van Sint January *et al*. (1997) also argues that it is the consensus that drought tolerant plants is also mediated at the cellular level.

Materials and Methods

The experiment was conducted at the Tissue Culture Laboratory Unit Laboratorium Kultur Jaringan UPT/Balai Benih Induk Hortikultura Dinas Pertanian Propinsi Sumatera Utara, Jl. Karya Jasa No. 6 Gedung Johor Medan in March 2012 to June 2012. This study used the basic media of Murashige and Skoog (MS). The study uses CRD (completely randomized design) non factorial was used with PEG treatment of 5 level which repeated 5 times, namely: P1 = 10%, P2 = 20%, P3= 30%, P4 = 40% and P5= 50%. Granola potato explants prepared by growing potatoes in a polybags containing soil and manure mixture. After 25 days, young potato used as a source of explants. Explants were obtained by excising the young plant potatoes, then planted on liquid MS medium with the addition of PEG 6000 at a concentration of 10%, 20%, 30%, 40 % and 50% (Figure 1). The parameters observed at the end of the study were percentage of living plantlets (%), plant height (cm), number of roots, and number of nodes.

Results and Discussion

Percentage of Survive Plantlets. Concentration of PEG was highly significantly reducing the percentage of survival plantlets (Figure 2). The relationship between the concentration of PEG to the percentage of survival explants follow negative linear regression with an equation of $Y=-0.666x + 112$, $R^2=0.726$, the higher the concentration of the PEG, the lower the percentage of living plantlets, that means that potato cuttings are sensitive to PEG treatment in vitro and was not able to survive much longer.

Plant height. The relationship between the concentration of PEG with potato explants plant height at 6 weeks age was also follow the negative linear regression with an equation of $Y=-0.075x + 5.242$, $R^2= 0.902$ (Figure 3). In this case, the potential decline in water media by

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the addition of PEG, which in turn lead to the decreased of proliferation of tissue explants, growth and shoot regeneration. The Number of Roots. The relationship between the concentration of PEG with the number of roots of potato explants also following the negative linear regression, with an equation of Y= -0.062x + 4.112, R^2= 0.939 (Figure 4). The Number of Nodes. The relationship between the concentration of PEG with the number of nodes was following the linear regression with an equation of Y= -0.068x + 5.105, R^2=-0.904 (Figure 5). The use of PEG as osmoticum was suspected to stress can reduce plant cell elongation and expansion, which in turn lowered the growth rate. Sirait, *et al*. (2012) also showed that PEG treatment significantly lowered the number of roots, number of nodes, number of leaves, plant height and wet weight of explant.

Figure 1. Planlet Potatoes Growing *in vitro* at the ages of Six Weeks with PEG Treatment

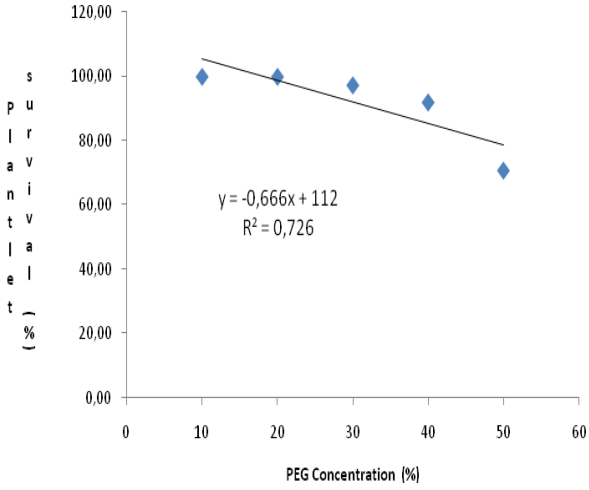

Figure 2. Relationship Concentration of PEG with Survival Plantlets Percentages

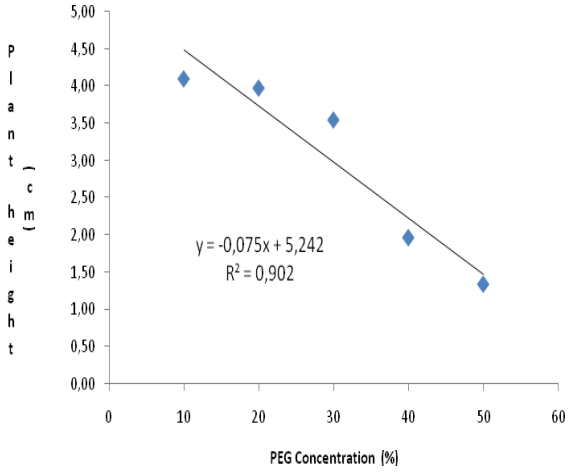

Figure 3. Relationship Concentration of PEG with Plant height

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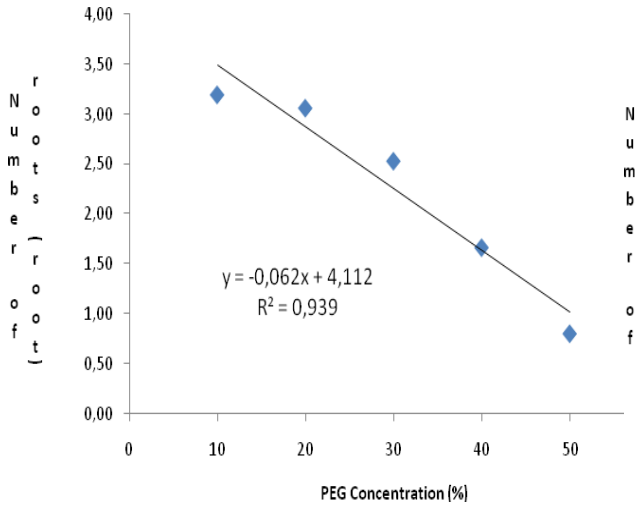

Figure 4. Relationship Concentration of PEG with Number of Roots

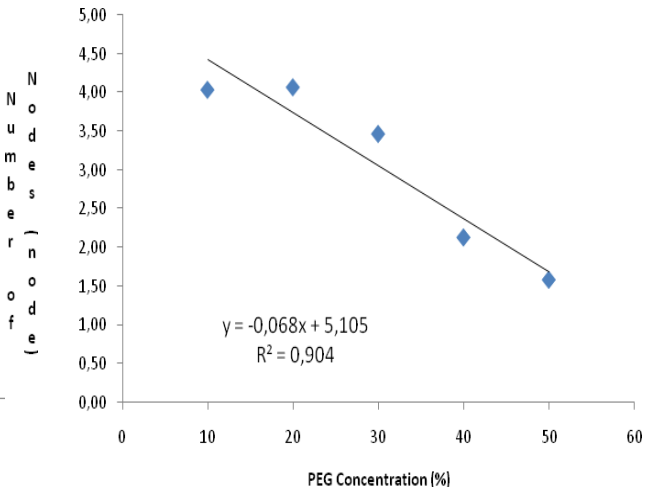

Figure 5. Relationship Concentration of PEG with Number of Nodes

Conclusions

Conclusion. Increasing the concentration of PEG reduce the percentage of plantlets survival, reduce plant height, number of roots and number of nodes *in vitro*. Suggestions. Drought Tolerant (*in vitro)* needs to be evaluated in physiological character and molecular testing.

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