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IN VITRO GROWTH AND REGENERATION CHARACTERISTICS OF DIVERSE POPULATIONS OF SWEET POTATO (IPOMEA BATATAS (L.) Lam)

(Croissance et caractéristiques de régénération in vitro de diverses populations de Patate douce)

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SUMMARY

Populations of open-pollinated seedlings from three distinc gene pools were surveyed for in vitro growth and developmental characteristics, using four different tissue culture procedures. Petiole explants from young leaves were used to initiate callus cultures (Murashige-Skoog agar medium with vitamins, 3 per cent sucrose, 1 mg/l 2,4-D and 1 mg/l kinetin) which were maintained on the same medium with a reduced level of 2,4-D (0.2 mg/L) and evaluated for callus growth rate, friability and callus color. Callus from these cultures were transferred to three separate regeneration media for the evaluation of morphogenetic potential. Small shoot tips were also used to initiate callus cultures on MS medium supplemented with thiamine, 3 per cent sucrose and 2 mg/l 2,4-D, which were transferred to proliferation media including 0.25 mg/L kinetin before transfer to growth regulator-free regeneration medium. Early callus characteristics were significantly correlated with later regeneration. Significant differences in shoot and root regeneration and in somatic embryogenesis were found among and within populations and among culture protocols.

RESUME

Des populations de plantules obtenues par pollinisation libre à partir de 3 pools géniques distincts ont été analysées pour la croissance et les caractéristiques de développement in vitro, en utilisant quatre méthodes différentes de culture de tissu.

Des pétioles de jeunes feuilles sont utilisées pour initier des cultures des cals (milieu gélosé de Murashige et Skoog avec vitamines, 3 pour cent de saccharose, 1 mg/l de 2,4D et 1m/l/l de kinétine.

On évalue le taux de croissance des cals, leur friabilité et leur couleur. A partir de ces cultures, les cals sont transférés sur trois différents milieux de régénération pour l'évaluation du potentiel morphogénétique.

Des petites tiges sont aussi utilisées pour initier des cultures de cals sur le milieu MD supplémenté avec de la thiamine, 3 pour cent de saccharose et mg/l de 2,4D. Ces cals sont transférés sur un milieu de prolifération contenant 0,25 mg/l de kinétine avant leur passage sur un milieu de régénération dépourvu de régulateur de croissance. Les caractéristiques de précocité des cals sont significativement corrélées avec leur régénération tardive.

Des différences significatives dans la régénération des tiges et des racines ainsi que dans l'embryogenèse somatique sont trouvées entre et à l'intérieur des populations tout aussi bien qu'entre les protocoles de culture.

Tissue culture of sweet potatoes (*Ipomea batatas* (L.) Lam.) has received much attention from researchers in recent years. Potential applications of tissue culture techniques to a vegetatively propagated food crop such as sweet potatoes are numerous. For example, tissue culture could eliminate much of the expense, time and labor now involved in plant production in temperate climates and could insure a reliable source of disease and insect-free plants in tropical climates.

Aplication of such techniques in the improvement of this important world food crop depends on successfully initiating callus, maintaining callus cultures and regenerating plants from those cultures. Many *in vitro* studies, therefore, have been concerned mainly with optimum explant source, cultural conditions and media composition.

Previous reports indicate a significant effect of cultivar on results of *in vitro* techniques. In regenerating plants from another cultures, TSAY and TSENG (1979) found cultivar differences in callus production from another cultures of sweet potato and reported plantlet regeneration from embryoids in only one clone. LITS and CONOVER (1978) saw similar differences in lateral bud cultures and other researchers found differences in regeneration using callus derived from explants of storage root tissue (YAMAGUCHI and NAKAJAMA, 1973). JARRET et al (1984) found that the optimal medium for embryogenesis and the frequency of embryogenic cultures differed with genotype. This phenomen has previously been reported for other crops in tissue culture such as corn (LU et al, 1983), wheat (LARKIN et al, 1984), tomato (GRESHOFF and Doy, 1972), red clover (KEYES et al, 1980) and potato (SIMON and PELOQUIN, 1977).

Recent observations in our laboratory indicated that genotypic differences are important in the variability or reports from sweet potato tissue culture studies. The varying degrees of success reported in the literature in proliferating cells and regenerating whole plants could thus