Introduction of mutations and variation by using mutagens on some indoor plants

Hanan Mohamed Yousef

This investigation was carried out at the Tissue culture laboratory, Horticultural Department, Faculty of Agricultural Moshtohor, Zagazig University during the period from 1999 to 2002. This study aimed to in vitro establishing of Yucca elephantipes medicos and Philodendron scandens plants. Also, studying the effect of somaclonal variations and different mutagens on induction of mutation and variations. In-addition, studying of proliferation and rooting as well as acclimatizing of these plants. Moreover, cytological studies were took place for phenotypic variant plantlets.Homogenous yucca and philodendron plants were taken as mother plants. Different explants either direct (shoot-tips and one-node cuttings) or indirect regeneration (leaf) discs and internode segments) were prepared . The explants were sterilized by immersing in 15% Clorox with two DROPs of Tween —20 for 15 minutes. Then cultured on different medium types for direct and indirect regeneration. Somaclonal variations and induction of mutations either physically (Gamma rays and Electromagnetic waves) or chemically (colchicine and sodium azide) were studied. Also, different cytokinin types with different concentrations were included. Moreover, different medium strengths, different GA3 concentrations, medium state, and different auxin types with different concentrations were concerned. Meanwhile, acclimatization by using different agricultural media was established. Furthermore, cytological studies for phenotypic variant plantlets were took place. The obtained results can be summarized as follows for both yucca and philodendron. 5.1. Establishment stage 1-Shoot tip surpassed one-node cuttings in increasing direct regeneration parameters while leaf discs explant was superior in maximizing callus production.2-Modified Murashige and Skoog medium was the best medium in increasing explant development, callus production, direct regeneration, and greening parameters.3-Supplementation of the culture medium with 2.0mg/L NAA was effective in maximizing callus production.4-Culturing of mature callus on modified. Murashige and Skoog free from hormones enhanced the largest number of regenerated plantlets.5-Incubation of callus for 6 months without subculturing induced the highest percentages of phenotypic variabilities. However, callus incubated for one month only succeeded in regenerating plantlets with high numbers, shoot length leaves and rooting parameters.6-Gamma rays had adverse effect on the most phenotypic and chemical parameters i.e. plant height, number of shoots and root as well as chlorophyll-a & b, caritenoids and total indoles specially with higher doses.7-Subjecting of the explants to low doses of Gamma rays maximized percentages of variable plantlets in plant height and leaves8-Exposing of explants to microwave for 4 and 8 parameters (fresh weight, number of shoots and both number and length of roots as well as chlorophyll a-b, cartenoids, and total indoles).Summary and Conclusion 1929-Percentages of variable plantlets as result of exposure to microwave for 8 seconds were very high in both plant height and leaves. 10-Colchicine surpassed Sodium azide in improving growth parameters i.e. fresh weight, dry weight, number and length of roots and some chemical parameters i.e. chlorophyll-b, chlorophyll-a and carotenoids. 11-Immersion of colchicine at low concentration for small period encouraged both phenotypical and chemical parameters. Also, maximized percentages of variant plantlets in both plant height and leaves.12-Supplementation of the cultured medium with 0.005 colchicine encouraged most of growth parameters i.e. fresh weight, dry weight, number of shoots and chemical parameters i.e. chlorophyll-a&b and carotenoids. However, adding of 0.01% sodium azide to the cultured medium maximized number and length of roots as well as totalindoles.

13-Addition of 0.02% colchicines to the medium increased percentages of variant plantlets in plant height plantlets in plant height while 0.002 and 0.01% plantlets in leaves.5.2. Proliferation stage1-Using 2-ip in proliferation medium reduced necrosis and callus production while enhanced the highest growth and greening. However, BAP encouraged the best proliferation and callus production 2-Callus production and proliferation were maximized by using 4.0mg/L cytokinins while 2.0ing/L improved both growth and greening and reduced necrosis.5.3. Rooting stage: 5.3.a. Shoot elongation:1-Full and one-half medium strengths were preferable in encouraging while, proliferation elongations and greening parameter while, proliferation was enhanced when full medium strength was used.2-Using of 2.0mg/L GA3 induced the longest plant height and fresh weight parameters while medium free from GA3 (control) was elThetive in improving the other parameters (dry weight, number of shoots and rooting).5.3.b. Root formation : 1-Culturing plantlets on either solid or liquid medium state enhanced the highest growth and rooting parameters while, semi solid medium encouraged the best proliferation.2-Addition of IAA at 1.00mg/L level improved growth and greening parameters while using 2.0mg/L IBA was suitable for maximizing rooting.5.4.Acclimatization:Twenty-formulation of the agricultural media from sand and peat moss at rate of 3:1 were effective in increasing survival percentages and acclimatization of plant parameters i.e. plant height, shoot thickness, number of leaves, and greeningparameters.5.5. Cytological studies:1-Exposure of explant material to higher doses of Gamma rays maximized lagging chromosomes stickiness and polypolar cells of chromosomal abnormalities.2-Subjecting of explant materials for microwaves for 8 seconds succeeded in inducing low chromosomal abnormalities i.e. stickiness, aneuploidy, polyploidy, and micronucleate per cells.3-Immersion of explants in 0.02% lagging chromosomes colchicine for 30 minutes and 60 minutes induced higher, stickness, aneuploidy and micronucleate per cells as well as medium chromosomal fragments. 4-Immersion of explant materials in 0.05% Sodium azide for 60 minutes encouraged higher stickness polypolar cells and micro nucleate per cells culturing of shoot tips on modified Murashige and Skoog medium is suitable for direct regeneration while supplementing the medium with 2.0mg/L NAA is suitable for callus production which regenerated into large numbers of plantlets when cultured on medium free from hormones. Somaclonal variations effective in producing number of variant plantlets in plant height and leaves and it can be established by incubating the callus without subculturing for 6 months. Gamma rays is effective than microwave in maximizing percentage of variant plants. Also, immersion of Sodium azide with 0.02% for 30 minutes is preferred than colchicine in maximizing aneuploidy and polyploidy of chromosomes. Moreover, using of 2.0mg/L BAP increased proliferation and callus production. Meanwhile supplementing the fall medium strength wit 2.0 mg/L GA3 improved shoot elongation. In the same time, using liquid medium supplemented with 2.0mg/L IBA encouraged rooting which can be acclimatized by planting in3:1 sand peat-mess ratio.