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Invitro conservation of some rare and threatened desert plants in Qatar

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Background A range of natural factors, invasive animals and human activity have been severely affecting stability of the ecosystem, resulting in the annihilation of plants habitats and so plant endangerment or even extinction. In Qatar, urgent action needs to be taken to stop decline of desert plant species as well as an effective strategy should be applied to reverse and save these wild endangered plants. Otherwise, they will be faced with the danger of their extinction in near future. Therefore, it is very important to have knowledge of protection measures, such as replanting and propagating through tissue culture technology, to protect the biodiversity in Qatar. Plant in-vitro culture systems have been used as an alternative approach to propagate and conserve a large number of rare and endangered plant species that show difficulties to be propagated using conventional methods of propagation. It was reported that standard culture environment could be effectively employed for short-term in-vitro conservation of different plant germplasm, through increasing intervals between subcultures especially in slow growing plant species. Objectives In the current study, conservation of rare and endangered desert plants using in-vitro culture were developed. Generally, these plants are not easy to be propagated by classical horticultural methods. Different techniques including micro-propagation, in vitro seed germination, and regeneration from callus were applied to propagate and conserve three endangered plant species in Qatar; Leptadenia pyrotechnica, Glossonema varians and Prosopis cineraria. Methods Collection of endangered plant species Location of the endangered plant species were identified and the plant parts- seeds, stem, shoots, roots, nodal cuttings or whole plant- depending on its type and availability, were collected. Surface sterilization

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of the collected material The plant materials were washed with tap water to remove dust and debris, then were soaked in 70% ethanol for 1-2 min, then were treated with sodium hypochlorite or Clorox for 10-20 min followed by rinsing 3-5 times with sterilized distilled water under aseptic conditions. In-vitro plants formation Organ culture using nodal sections of the plants were cultured on hormone-free MS medium (0.5X) for in vitro plants formation. For seeds were cultured on medium containing gibberellic acid (GA3) for efficient seeds germination. In this way, in vitro plants were established and multiplied to produce large number of healthy clones. In case seeds or nodal cuttings are not available, other plant parts like leaf or root were used as explants to initiate callus tissues. Results Seeds of Leptadenia pyrotechnica were collected, surface sterilized and germinated under aseptic condition using 0.5X MS media. In-vitro employing tissue culture via callus and shoot induction using different growth regulators was explored. Seedlings from in-vitro germination of the seed were used as explants. The results revealed that the highest callus production was obtained using 2.0 mg/L BAP. In addition, 0.5 mg/L and 2.0 mg/L NAA were good for callus initiation, compared to other hormones. Seedlings of Glossonema varians were collected were used as an explant for callus induction. Several plant growth regulator were used to initiate callus including 2, 4, D, NAA and BAP and their combinations. The results showed that the best plant growth regulators to induce callus were 1.5 mg/l IBA and 2mg/l BAP. Prosopis cineraria, is a famous tree in Qatar. It is not easy to be propagated by classical horticultural methods. Seed dormancy was broken by scratching via sand paper. Several plant growth regulator were used to initiate callus including 2, 4, D, NAA and BAP and their combinations. The results showed that the best plant growth regulators to induce callus were both 2.0 mg/l 2, 4, D and 1.5 mg/l IBA. The obtained callus will be treated to regenerate new plantlets. Adventitious shoots and roots formation will be induced and a large number of in vitro plants will be produced. The in-vitro grown clones will be hardened (acclimatized) for greenhouse and later field conditions. The in-vitro plants will be removed from the cultures; medium will be removed by washing with running water and sown in pots. The pots will be covered with plastic sheets to keep high humidity and gradual removal of the plastic will harden the plants for greenhouse. Conclusions Recently, in-vitro culture technique of desert plants has received importance because it can be used for the fast propagation and ex situ conservation of endangered plants. The success of micro-propagation and in vitro conservation of the selected endangered plants depends on the best choice of the explants, the efficiency of the sterilization method and correct plant growth regulator. The best in-vitro conservation of the selected plant species is in MS media with the following plant hormones 2, 4, D, NAA. IBA and BAP. Acknowledgements «This study was made possible by UREP grant # UREP19-209-1-037 from the Qatar national research fund (a member of Qatar foundation). The statements made herein are solely the responsibility of the author(s).»