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EFFECTS OF SALINITY AND PLANT GROWTH MEDIA ON IN VITRO GROWTH AND DEVELOPMENT OF TARO (*COLOCASIA ESCULENTA* L) VARIETIES

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Taro *Colocasia esculenta* is a staple food in most countries of the South Pacific region. However, the recent changes in the climatic conditions and the associated factors became a threat to growing taro in the region. Rising sea level and frequent dry and wet conditions had led to increased soil salinity which is a limiting factor in producing taro in these atoll islands. The aim of this research was to screen selected taro varieties based on their ability to tolerate salinity conditions in Samoa. Effects of three salinity levels (0.2, 3% and 5%), and growth hormones Benzylaminopurine (BAP) and Thidiazuron (TDZ) were examined on growth and development of *in vitro* grown taro varieties. Plant height, number of leaves, and number of roots produced were compared in the selected varieties. Results suggest that all varieties had callus induction and regeneration in MSO medium. Addition of BAP induced better growth and the plants produced higher number of leaves, while TDZ improved roots proliferation in *C. esculenta*. Solomon variety performed best in high salinity conditions. Samoa-1 grew taller and had more leaves and roots compared to Samoa-2 variety. Thus, we suggest Solomon and Samoa-1 could perform better in high-salinity conditions.

Keywords: Taro, salt tolerance, climate change, *in vitro* screening, taro leaf blight

Taro (*Colocasiae esculenta*) is one of the important root crops grown throughout the tropical and subtropical regions. This crop remained a staple food for most countries of the south Pacific region including Fiji, Cook Island, Tonga, the Solomon Islands, PNG and Samoa (Iosefa et al., 2012). The corm of *C. esculenta* is an excellent source of energy, fibre and nutrients such as calcium and iron. The leaves are excellent source of protein, dietary fibre and wide range of vitamins and minerals including carotene, potassium, calcium, phosphorous, iron, riboflavin, thiamine, niacin, vitamin A and vitamin C (Hunter et al., 2000). It is also considered a prestige crop for traditional feasts, gifts and fulfilling social obligations in the region.

Despite several pest and disease epidemics, this crop remained the favourite food of the region. Currently, Fiji is the major producer and exporter of *C. esculenta* in the region. The Taro leaf blight (TLB) *Phytopthora colocasiae* epidemic in 1993 devastated the taro industry in Samoa and since then Samoa is struggling to re-establish its taro export market (Hunter et al., 2000; Iosefa et al., 2012). Samoan government in partnership with several organisations including the Australian Centre for International Agricultural Research (ACIAR), Australia developed and released TLB resistant varieties of *C. esculenta*. Among the released varieties, Samoa-1 and Samoa-2 are the preferred varieties for local consumption and export market (Iosefa et al., 2012).

Recent research on the weather pattern suggests that the South Pacific region is highly vulnerable to extreme weather conditions (Barnett, 2011). Agriculture of Samoa and other countries of the region is vulnerable to coastal inundation and extreme rain fall pattern that led to high soil salinity conditions (Barnett, 2011). Abiotic stress is created by combination of water deficiency and Sodium toxicity due to sodium and chloride and creates negative effects on development of the plant (Munns, 2002). Plants can tolerate high salt concentration by withstanding the adverse water relations induced by salinity or decreasing the movement of toxic ions to the shoots (Munns and Tester, 2008).

Colocasia esculenta is a perennial herb of Aracea family that can grow up to 1–2 meters high. Depending on the type of variety, it takes 6–12 months before taro can be harvested. It is generally grown in wet, humid environment and requires a rainfall of over 2000 mm/year but can still tolerate lower rainfall (Hunter et al., 2000). It is generally grown as a mono crop in Samoa, however, it can be grown in multiple cropping systems with other root crops such as cassava, yam and prefers soils with pH 5.6–6.5.

C. esculenta is highly susceptible to cyclones, flooding and cannot tolerate high salinity conditions and such climatic conditions create stress which could lead to vulnerability pest and disease attack (Barnett, 2011; Kant et al., 2015). These constraining factors warrant the conservation of the taro genetic material for future generations and the development of pre-screening methods for salt tolerant varieties (Munns and Tester, 2008). The availability of salt tolerant cultivars requires efficient rapid multiplication techniques to enable effective distribution of planting material to the farmers for backup. Tissue culture can effectively be used in the rapid screening and multiplication of plants (Chand and Pearson, 1998). The aim of this research was to screen selected *C. esculenta* varieties, two highly resistant TLB cultivars and Solomon and Indonesian cultivars for salinity tolerance

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