
50. Kenyan potato varieties respond differently to stress induced by polyethylene glycol via hydroponic nutrient delivery system

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Potato is the foremost non cereal food crop in Kenya. Projections indicate that the Kenyan population will grow from the current 42 million to 55 million citizens by 2022 accompanied by a 7% growth in urban demand for potatoes over same period. Expansion of area under potato production is one way to ensure the increasing demand is met. This strategy may involve producing potatoes in parts of the country which are warm and receive low annual rainfall. A study was conducted to assess 26 Kenyan potato varieties for tolerance to induced drought stress. In order to create a controlled environment for the study, a greenhouse was constructed and equipped with a hydroponic system for nutrient delivery to the experimental plants. Two parallel nutrient delivery channels were created to supply nutrients to plastic gutters into which potatoes were planted. One channel delivered the nutrient solution to control plants only and the second one channel delivered the nutrient solution amended with polyethyl glycol to test plants. Each nutrient delivery channel was equipped with a pump to circulate the solution from the tank to the plants and back into the tank. The nutrient solution consisted of 136g Potassium phosphate, 236g Calcium nitrate, 504g Potassium nitrate, 100g Magnesium sulphate and 12 g Microsol B (to provide Fe) per 1000 litres. Polyethylene glycol (PEG 6000) was added to the tank supplying test plants to obtain a final concentration of 30mg per litre of solution. Eight well sprouted tubers of each variety were selected for planting. Tubers were supported on inert sponges positioned in the gutters. For each variety, four tubers were placed in a gutter receiving nutrients only and the other four receiving the nutrient solution plus 30mg/L of PEG 6000. For the later plants, however, PEG 6000 was introduced 45 days after planting and withdrawn two weeks later. Data were collected on number and weight of tubers, foliage dry weight. In addition temperature, humidity and light intensity data were captured on Hobo data Logger. Anova was performed on plant yield using GenStat. Observations during the experiment and data collected indicate that in general, PEG 6000 caused stress to test plants. Additionally, there were significant differences ($P=0.05$) among evaluated potato varieties in their response to induced stress. Responses ranged from mild effect in some varieties (Kenya Karibu, Ngure, Tigoni, Kenya Baraka, Changi, Desiree) to strong retardation of growth in test plants of some varieties (Purple Gold, Arka, Stirling). We conclude that this hydroponic system based screening for drought resistance is an essential step in determining potato germplasm with potential for cultivation under water limiting and warm conditions. It may be employed in pre-selection of candidates from a large pool for onward evaluation under actual field conditions.