



Determination of vitamin C levels in callus, regenerated shoots and tap roots from carrot (*Daucus carota* L.)

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Abstract

One of the essential root vegetables that is abundant in bioactive substances like vitamin C is the carrot. There is a great deal of concern and research about the variation in vitamin C content of fresh *Daucus carota*. With an emphasis on tissue culture especially, this study seeks to advance existing approaches in the field of plant biotechnology. callus induction utilizing MS media supplemented with various concentrations of NNA and BA from 2cm pieces of hypocotyls. through using MS media supplemented with 1 mg/L NAA + 4 mg/L TDZ under light luminescence, shoots were regenerated from calluses. Vitamin C levels were measured in the mother plant's tap roots, regenerated shoots, and callus tissue by using UV spectrophotometry method. The findings showed that vitamin C concentration in callus tissue and newly grown shoots was superior to that in tap roots and mother plants, and that the level of vitamin C increased in newly grown shoots of plants.

Keywords: *Daucus carota*, Vitamin C levels, Shoot regeneration.

Introduction

Fruits and vegetables are high in minerals and phytochemicals, which are known for their nutraceutical and health advantages (Tiwari & Cummins, 2013). The plant generated about 3000 chemical compounds that are extensively utilized in a variety of applications such as medications, food coloring, and colors (Núñez et al., 2006). The cultivated carrot *D. carota* L. is one of the most well-known vegetable plants in the world due to its great production capacity and usage as a fresh or processed product (Dawid et al., 2015). Because of their high nutritional value and exceptional preservation properties, they serve an important role in human nutrition (Leja et al., 2013).

D. carota L. consider a good source for carbohydrate, mineral and vitamin include vitamin A and vitamin C (Surbhi et al., 2018). Vitamin C plays an important role in the body's defense against bacterial and viral infection, iron absorption, wound and tissue healing, collagen formation, and reducing the body-harmful effects of free radicals (Igwemmar et al., 2013).

Carrots have more vitamin C content than plums, pears, and grapes, among other fruits and

vegetables. The overall vitamin C concentration in plant tissues increasing throughout summer due to the increased strength of light. Vitamin C concentrations have also been seen to be influenced by the horticulture crops' maturity at harvest time, with reduced concentrations as carrot age at harvest time rose (Leong & Oey, 2012). It seems acceptable to employ tissue culture methods for its production given the influence of environmental and genetic variables on the level of carotene and vitamin C present in fruits, seeds, and leaves. Since then, several papers have been published on the effect of various growth factors on callus initiation (Khashan & Muhsin, 2015).

Materials and Methods

Callus Induction and Shoots Regeneration: Sterile seedlings production: For seed culture, *D. carota* seeds were used. Healthy seeds were cleansed with detergent water and kept in running water for one hour. After being submerged in a solution of sodium hypochlorite (2%) for 15 minutes, 70% ethanol for one minute, and finally 3-5 times in sterile water, the seeds were surface sterilized. (Awika, 2004).

Callus Induction: Seeds were cultured on free MS medium. After two weeks of cultivation resulted in