



RESEARCH ARTICLE

Changes in amino acid levels and their effects on parthenocarpic fruit formation in young Barhi date palms *Phoenix dactylifera* L. derived from tissue culture

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Abstract

This research aims to analyse the quantities of non-essential amino acids (histidine, arginine, alanine, cysteine and tyrosine) and essential amino acids (aspartic, glutamine, serine, glycine, phenylalanine, threonine, valine, isoleucine, leucine, methionine and lysine) in the leaves of three different date palm phenotypes. These phenotypes are derived through tissue culture from and parthenocarpic fruits (shees) produces, normal fruits (normal) produce and propagated by offshoots of normal fruits (vegetal) produces. This study focuses on three distinct stages: pre-flowering, flowering and fruiting. The amino acid levels were determined using HPLC. Results of this study indicate that the shees phenotype has the lowest levels of amino acids compared with the normal and vegetal phenotypes. Most amino acids exhibit a consistent trend throughout the examined stages, with levels declining from the pre-flowering stage to the flowering stage, but show an increase in the fruiting stage compared with the preceding stage. In addition, the results reveal that methionine is absent in the shees phenotype during all stages of the study but present at high levels in the vegetal and normal phenotypes. These results indicate that the metabolism of amino acids varies among different phenotypes of date palms. This variation directly or indirectly affects the development of parthenocarpic fruits in date palms of the Barhi cultivar derived from tissue culture during the juvenile period.

Keywords

essential amino acids; HPLC analysis; flowering; phenotypes; methionine

Introduction

Date palms (*Phoenix dactylifera* L.) show great importance as a fruit crop because of its highly nutritious fruit and beneficial by-products, and it serves as a primary food source for humans and livestock in arid regions worldwide (1). Date palms are traditionally propagated through seeds or offshoots (2). However, seed propagation is not preferred because of the heterozygosity it brings. The resulting plantlets from seeds are not identical to the mother plant and are of lower quality. Moreover, they are approximately 50% male (3). On the contrary, propagation through offshoots is considered a superior method. However, the number of offshoots produced from each tree during the palm's lifespan is insufficient (4). Tissue culture, an effective technique for the rapid mass production of