Journal of Plant Biochemistry and Physiology
ISSN: 2329-9029

Lahlou M, J Plant Biochem Physiol 2013, 1:4
Doi: 10.4172/2329-9029.1000e109

Editorial

Open Access

Current Trends in Plant Vitamin Biosynthesis

Mouhssen Lahlou*
Ministry of Higher Education, Scientific Research and Professional Training, Idriss Al Akbar Street, Hassan

Editorial

Several scientists are interested in the biochemistry and physiology of plant and in plant metabolism. Currently, scientific works are focusing on the metabolism of vitamin compounds. Vitamins were first discovered, almost a century ago, as vital nutrients that must be taken in the human diet.

Research has also determined that plants, like humans, can reap great benefits from vitamins and other nutritional supplements. The most famous of these, of course, was the discovery around 1940 that vitamin B-1 played an important role in the metabolism of plants.

In fact, plants synthesize many of the vitamins that animals require like vitamin C. However, there is some evidence that plants benefit from vitamins. When growing plants in tissue culture, it is often helpful or even necessary to add some of the B vitamins. Specifically B1, B6, niacin and B12 are used. Germination of many seeds is accelerated by small doses of vitamins of the B group (niacin, thiamin, folic acid) and vitamin C.

Tissue culture mix includes Vitamins; A, C, D, B7, B1, B2, B3, B5, B6, B8, B9, B12.

Today, there are dozens of vitamin based plant tonics that blend vitamin B-1 with other beneficial vitamins, hormones, and botanical ingredients proven to enhance plant growth, root development, disease resistance, and more.

There are commercial products that contain vitamins for use in seed germination, for transplanting, for hydroponics and for tissue culture. Those containing auxin (a phytohormone) can aid in surviving water stress. Many packaged products offer vitamin B1 or thiamine as a protectant for transplant shock but it is the auxin (IAA) that is required.

Vitamin C is essential for plant growth. Vitamin content in plants will vary by their growth conditions and the variety of plant. Cold climate apples and roses are 4 to 10 times richer in Vitamin C than the varieties adapted to Southern countries. Plants lacking the 2 genes to make Vitamin C cannot grow beyond seedling stage. Vitamin C protects the plant against UV damage during photosynthesis.

Yet, it is remarkable that after all this time, we are still not fully aware of how these essential compounds are synthesized in our most important source of them, plants. This is particularly apparent for some of the B complex vitamins, e.g. B1 and B6. Moreover, because this knowledge has been lacking, albeit until relatively recently in the case of vitamin B6, it was not known what effect these compounds have on plants themselves. The onset of the genomic era and the numerous molecular tools currently available to the community make this kind of research feasible. On the one hand, while there is a fundamental interest in how these molecules are biosynthesized, there is also considerable attention given to their modes of regulation and transport. For example, the relevance of RNA had long been restricted to the translation of genetic information from DNA to proteins. The emerging awareness of the role of RNA, e.g. riboswitches, in gene control has changed this view dramatically. Riboswitches in particular have an enormous untapped potential and are predestined to act as an archetype for the development of artificial regulators and nanosensors. Metabolite transport is also an aspect of plant metabolism that is still far from completion. Although the transport of metabolites can be inferred from the location of the enzymes of the pathway, many of the proteins involved in membrane transport and intracellular trafficking have not yet been identified. Part of many researches is dedicated to unraveling these mechanisms in plants.

Another area of scientific interest is that the absence of vitamin biosynthesis pathways from animals, means that enzymes specific to the routes may serve as novel antimicrobial or herbicide agents. In addition, many of the reactions involved in the biosynthesis of these compounds involve unprecedented chemistry and have not been reconstituted *in vitro*. While it is relatively easy to identify mutations in genes involved, it is considerably more difficult to identify the specific reaction being catalyzed by the respective protein. This large gap of knowledge between sequence information and function of enzymes involved in biosynthetic pathways, involving unprecedented reactions, is a major challenge in the field of functional genomics. Thus, scientists also strive to characterize the biochemical and biophysical aspects of the various proteins involved in these pathways. Various model organisms are employed in the laboratory, namely the Gram-positive bacterium, like *Bacillus subtilis*, the budding yeast *Saccharomyces cerevisiae* and the plant model Arabidopsis thaliana.

Furthermore, the elucidation of the biosynthesis and regulatory networks may lead to the possibility of overproduction of these compounds for beneficial effects. For example, recent findings suggest that the vitamin B complex appears to have substantial roles in various stress responses. In particular, vitamin B6 is reported to be an antioxidant with potency equivalent to vitamins C and E. Thus, another part of other scientific work focuses on understanding the antioxidant properties of vitamin B6 as well as clarifying its role in plant defense, which will be of value in the development of stress tolerant crops.

Due to the complex nature of the kind of this research, a vast array of chemical/biochemical techniques and methods are employed and needed in the laboratory, ranging from techniques in molecular biology, cell biology, genetics, and protein biochemistry to certain biophysical procedures.

***Corresponding author:** Mouhssen Lahlou, Ministry of Higher Education, Scientific Research and Professional Training, Idriss Al Akbar Street, Hassan, P. Box : 4500 – Rabat, Morocco, Tel: 212.537217638; Fax: 212.537217670; E-mail: lahloumoh@hotmail.com

Received August 07, 2013; **Accepted** August 10, 2013; **Published** August 17, 2013

Citation: Lahlou M (2013) Current Trends in Plant Vitamin Biosynthesis. J Plant Biochem Physiol 1: e109. doi:10.4172/2329-9029.1000e109