Advances in Crop Science and Technology

Nikkhah, Adv Crop Sci Tech 2015, 3:1
http://dx.doi.org/10.4172/2329-8863.1000e121

Editorial Open Access

Nutrient Assimilation Circadian Physiology: A Novel SciTech in Integrative Crop Production

Akbar Nikkhah*

Faculty of Agricultural Sciences, University of Zanjan, National Elite Foundation, Iran

This objective of this policy-making forum article is to establish a circadian physiological basis for nutrient intake-uptake orchestration in various crops. The ideology stems from the very recent discoveries in ruminant chronophysiology [1-6].

Chronophysiology is an evolutionary integrative interscience that esnables animals including humans to cope with the highly fluctuating environment [1-3]. Timing of eating and, thus, timing of nutrient uptake by splanchnic and peripheral tissues are proposed to orchestrate circadian rhythms of nutrient metabolism involving digestion, transport and assimilation [4-6]. Such a circadian orchestration of food intake and nutrient uptake, consequently, regulates appetite in animals and substrate take-up and assimilation in crops. This new science is concerned with how time of the 24-h period determines the type and efficiency of nutrient and substrate intake and use by crops and animals. As a result, the timing of nutrient availability determines how and to what extent crops and animals are capable to ingest and process different nutrients towards maintenance and productivity.

Should the optimum times of water and nutrient delivery to crops and animals – on a circadian basis – be accurately determined, productivity and health of plants and livestock can definitively be manipulated. Such an accomplishment would allow a more efficient utilization of natural resources for greater profitability of animal agriculture in the new era when and where resources are greatly inadequate. From a human health perspective, such a novel science would be crucially important because reliable hunger and nutrient ingestion predictions are vital for onchophobic provision of nutrients to different human cells that are differentially exposed to cancer [7,8]. Such knowledge will help formulate guidelines to prevent nutrient overuptake and substrate wastage in crops and to minimize risks from metabolic disorders in livestock and risks of obesity, insulin resistance, glucose intolerance and metabolic syndrome in human.

The evolutionary rhythms of food searching and intake behavior have led to development of circannual and circadian rhythms in plant and animal ecologies. With the rigorous historical changes in crop and animal production systems from tradition through modernity and postmodernity, such natural rhythms in nutrient and water intake-uptake have been modified. It thus is imperative to discover optimum times of nutrient and substrate delivery to such genetically and environmentally altered (and in many cases improved) crops for optimal production and health. In other words, modernization in crop production systems have made it in way more difficult to maximize synchronies between the external environment and internal plant physiology concerning nutrient assimilation. The same evolutionary trend, for instance, has led to increased risks of obesity, diabetes mellitus, and related cardiovascular issues in the modern human [7,8].

In a nutshell, timing of nutrient and water intake/uptake (i.e., fertilization and irrigation) can determine how rapidly, effectively, efficiently, proportionately and multipuposely the nutrients and water are intaken, uptaken, assimilated, and distributed towards different functions including deposition, oxidation, secretion, and excretion in plant cells. This chronophysiological cascade will establish the productivity, health and sustainability of crop production systems globally. Future research should explore more critical areas on innovative plant chronophysiology. The novel SciTech will probably be characterized differently among various crops.

Acknowledgments

Thanks to the Ministry of Science Research and Technology, National Elite Foundation, and University of Zanjan, Iran, for supporting the author's programs of optimizing the new millennium global science education.

References

1. Nikkhah A (2013) Chronophysiology of ruminant feeding behavior and metabolism: an evolutionary review. Biol Rhythm Res 44: 197-218.
2. Nikkhah A (2011) Bioscience of ruminant intake evolution: feeding time models. Adv. Biosci Biotechnol 2: 271-274.
3. Nikkhah A (2011) Ruminant chronophysiological management: an emerging bioscience. Open Access Anim. Physiol 3: 9-12.
4. Nikkhah A (2011) Science of eating time: A novel chronophysiological approach to optimize glucose-insulin dynamics and health. J Diab Mellit 2: 8-11.
5. Nikkhah A (2012) Timing of feed presentation entrains periprandial rhythms of energy metabolism indicators in once-daily fed lactating cows. Biol Rhythm Res 43: 651-661.
6. Nikkhah A (2014) Ruminant intake orchestration: An inter-science chronophysiological discipline. J. Vet. Sci. Technol 5: e112.
7. Nikkhah A (2014) Managing nutritional disorders by timing of food observation and ingestion: Insights from dairy science. Int J Dairy Sci Process 2: 1-2.
8. Nikkhah A (2014) Synchronizing periprandial nutrient intake rhythms through timing of feeding: A chronophysiological discovery in dairy cows. J Vet Sci Med Diagnos.

***Corresponding author:** Akbar Nikkhah, Chief Highly Distinguished Professor, Department of Animal Sciences, Faculty of Agricultural Sciences, University of Zanjan,National Elite Foundation, Iran, Tel: +98-24-35052801; Fax: +98-24-35053202; E-mail: anikkha@yahoo.com, nikkhah@znu.ac.ir

Received: December 22, 2014; **Accepted:** December 24, 2014; **Published:** December 26, 2014

Citation: Nikkhah A (2015) Nutrient Assimilation Circadian Physiology: A Novel SciTech in Integrative Crop Production. Adv Crop Sci Tech 3: e121. doi:10.4172/2329-8863.1000e121