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Carbohydrate Metabolism and Its Flow in Ecosystem

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Abstract **- The carbohydrates, often termed as sugar, are the "staff of life" for most organisms. On the basis of mass, they are the most abundant class of bio molecules in nature. Carbohydrates are also known as saccharides since many of those of relatively small molecular weight have a sweet taste and they are widely distributed molecules in both plants and animal tissues, Carbohydrates are also flowing continuously in all steps of ecosystem with flowing of energy. Carbohydrates are also metabolised with flowing in ecosystem. To maintain the essential requirements it is necessary the maintaining a proper ecosystem in interdependencies among plants, animals and surroundings.**

Keywords: Carbohydrates, Biosynthesis, Ecosystem, Food Chain.

I. Introduction

The carbohydrates, often termed as sugar as and saccharides, are the staff of life for most organisms. They are the most abundant class of bio-molecules in nature. They are widely distributed molecules in both a plants and animal tissues. They are indispensable for living organisms, serving as skeletal structures in plants and also in insects and Crustaceans. They also occur as food reserves in the storage organs of plants and in the lives and muscles of animals. In addition, they are an important source of energy required for the various metabolic activities of the living organisms; the energy being derived as a result of their oxidation. They also serve to lubricate skeletal joints, to provide adhesion between cells and to confer biological specificity on the surface of animal cells.

Living organisms (plants, animals and micro-organisms etc.) and their nonliving (abiotic) environment are inseparably interrelated and interact with each other. Any unit that includes all the organism organisms (the biotic community) in a given area interacting on with the physical environment to that a flow of energy beads to clearly defined biotic structures and cycling of materials between living and non-living in an ecological systems or ecosystem one characteristic of any system is organization that is unified group of components forming a systemised whole. O'Neill et. al. (1986) notes other properties of a biological organization, including ecosystems, as follows:

i. Ecosystems exist independently specific components.
ii. Its components are interdependent.
iii. An ecosystem has a function.
iv. It is active, something dynamic, past or present, is implied.
v. A sliding scale of organization exists.
vi. These attributes of organization apply fully to ecosystems.

II. Metabolism of carbohydrates

Glycolysis is the central pathway by which energy is extracted from carbohydrates. A. 10-step pathway lead from glucose to pyruvate is respiring cells. In anaerobic microorganisms or in cello with impaired respirations, pyruvate undergoes reductive reactions, so that the overall pathway pathways can proceed with no net change in oxidation state, Glycolysis can be viewed as occurring in two phases - first an energy investment phase in which ATP is used to synthesis a six carbon sugar phosphate that is split to yield two trios phosphates; and second, an energy generation phase, in which the energy of two high - energy compounds is used to drive ATP synthesis from ADP. The enzymes phosphofructokinase pyrurate kinas and hexokinase are the major sites for control of the pathway. Much of the control is related to the energy needs of a cell, with conditions of leah energy charge stimulating the pathway to and conditions of energy abundance, retarding the pathway

All organisms also carry out gluconeogenesis, the synthesis of carbohydrate from non-carbohydrate from three carbon and four carbon compounds - Gluconeogenesis uses seven glycolytic enzymes and four specific gluconeogenetic enzymes, the latter to bypass the three irreversible steps in glycolysis. The four enzymes specific to gluconeogenesis are pyruvate carboxylase due phosphoenolbyruvate carbonciykimasege fructose-1, 6,- biphosphatase, and glucose to gelteose – 6-phosphetase. Regulation occurs at the site of these three substrate cycles. Control is supremely important in animal metabolism, requiring the blood glucose level be maintained within narrow limits. Hormonal and allosteric mechanisms are involved, with fructose -2,6-biphosphate being a key regulator.

Intracellular polysaccharide stores in animal (glycogen) are mobilized by a hormonally controlled metabolic cascade in

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which CAMP transmits the hormonal signal and sets in motion events that activate the breakdown of glycogen to glucose-1-bhosphate, Glycogen phosphorylase is the rate limiting steps of the process, Synthesis of polysaccharides such as glycogen involves glycosyltransferases, enzymes that transfer the sugar unit from a nucleotide linked or otherwise activated sugar to an acceptors sugar at a non requiring end. Glycogen synthase used uridine diphosphate glucose as its glucosyl donor. The enzyme is regulated by hormonal and non-hormonal processes that are complementary and opposed to those that regulate glycogen breakdown by phosphorylase.

An alternative glucose oxidative pathway, the pentose phosphate pathway generates NADPH for reductive biosynthesis and pentose phosphates for nucleotide biosynthesis.

III. Characteristics of Ecosystems

According to the Smith (1966) followings are general Characteristics of ecosystem:

i. It is major structural and functional unit of ecology.
ii. The structure of an ecosystem is related to its species diversity, the more complex ecosystems have high species diversity.
iii. The function of the ecosystem is related to energy flow and material cycling through and within the system.
iv. The relative amount of energy needed maintain an ecosystem depends on its structure. The more complex the structure, the lesser the energy it needs to maintains itself.
v. Ecosystems mature by passing from less complex states. Early stages of such succession have an excess of potential energy and a relativity high energy of low per unit biomass. Later (mature) stages have less energy accumulation and its flow thro more diverse components.
vi. Both the environment and the energy fixation in any given ecosystem are limited and can't be exceeded without causing serious undesirable effect.
vii. Alteration in the environments represents selective pressures upon the population to which it must adjust. Organisms which are unable to adjust to the changed environment must need vanish.

The ecosystem is an integrated unit or zone of variable size, comprising vegetation, fauna, microbes and the environment. Most ecosystems characteristically possess a well-define soil, climate, flora and fauna and have their own potential for adaptation, change and tolerance. The functioning of any ecosystem involves a series of cycle, e.g. water cycle and the cycles of various nutrients. These cycles are driven by energy flow, the energy being the solar energy. Continuation of life demands a constant exchange and return of nutrients to and from the different components of the ecosystem.

Ecosystems are regarded con as energy processing units which are restrained or limited by the amounts of nutrients and water that are actually available. They seem to expend readily available energy in minimizing the limitation of water and nutrients. They display adaptive regulatory s mechanisms associated with destructive activities lead to conservation of the nutrient capital.

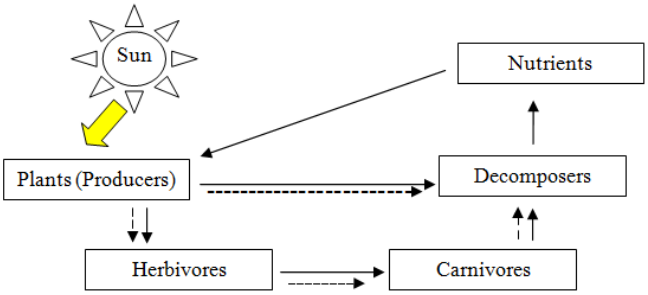

Figure 1: Energy (Broken Line) and Nutrients (Continuous Line) move in Ecosystem

IV. Food Chain in Ecosystem

The transfer of food energy from the producers through a series of organisms.

Herbivores - carnivores - Decomposers

With respect repeated eating and being eaten, is known as food chain. Producers utilise the radiant energy of sun which is transformed to chemical form: ATP during photo synthesis. Thus, in any food chain, green plants occupy the first trophic (nutritional) level the producers' level, and are called the primary producers. The energy, as stored in food matter manufactured by green plants, is then utilised by the plant eaters - the herbivores which constitute. the second trophic level - the primary consumers level, and are celled the primary consumers (herbivores) Herbivores in turn are eaten by the carnivores which constitute the third tropic level - the secondary consumers level, and are called the secondary consumers (carnivores). These in turn may still be eaten by other carnivores at tertiary consumers level i.e. by the tertiary (Carnivores). Some organisms are omnivores eating the producers as well as the carnivores at their lower level in the food chain. Such organisms thus may occupy more than one trophic level in the food chain.

A good chain in grass land ecosystem starts with grasses and herbs and goes through grasshoppers, the frogs, the snake, the hawk in an orderly sequential arrangement based on the good habits, whereas in a pond the order would start with

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phytoplanktons going through water fleas, smaller fish, bigger fish, birds, larger animal and so on.

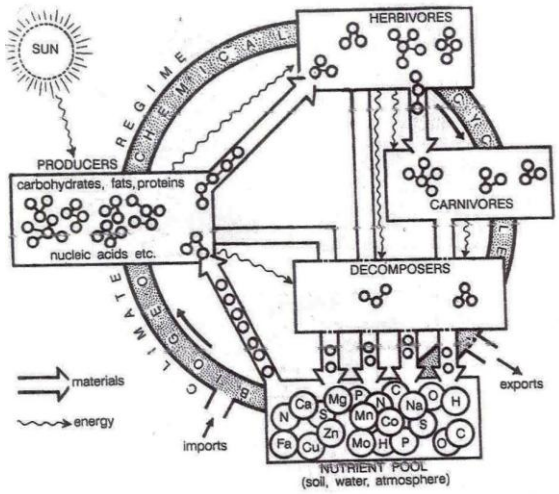

Figure 2: A generalized model of an ecosystem to show its structure and function (Sharma, P.D. 2013)

V. Conclusions and Recommendations

As shown in the figure the carbohydrates are also circulated with other nutrients and energy in the food chain of the ecosystem. The metabolic reactions are also circulated with the circulating the carbohydrates in the food chain of the ecosystem. Metabolic pathways are series of consecutive enzymatically catalyzed reactions that produce a specific product for use by an organism. The free energy released by degradation (catabolism) is, through the intermediacy of ATP and NADPH, used to drive the endergonic processes of biosynthesis (anabolism).

The rapid advances and technology have put the scientists and technologists on their heels to cope up with the simultaneous changes that have occurred during the past decades. Various types of revisions, rectifications as well as modifications and sometimes even together innovated ideas that developed in numerous fields of specializations have required to be incorporated with the advanced to the concerning field of the study. The innovative techniques have put the researches on consistent think and rethink level on the entertain high concepts related to the life science. The study of such concept as carbohydrate are to be considered with metabolism/biosynthesis of carbohydrates and their flow in ecosystem of land, aquatic, mountains, deserts and air etc. and interrelationship in between plants, animals and their habits and habitates.

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