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Plant Metabolism in The Quran's Perspective

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Abstract

Every living thing absolutely performs metabolism, one of which is plants. Metabolism is a series of chemical processes in living things that play a role in producing energy that is used to carry out life activities. This journal aims to find out that plant metabolism has a relationship with the Qur'an. This research uses a qualitative approach through literature studies regarding plant metabolism based on the perspective of the Qur'an. The origin of research data is from books, Al-Qur'an, journals, and documents. This article makes a very large contribution to human life, because of the urgency of plants including being one of the main sources of food, as in QS Shaad verses 87-88, QS Al-Maidah verse 88, QS Al-Baqarah (2) verse 61, QS Al-An'am (6) verse 14.

Keywords: al-qur'an; benefits; metabolism; plants

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INTRODUCTION

In essence, Allah wants the Qur'an as a guide for human life. In the Qur'an, Allah has written both explicitly and implicitly about the power of creation of nature (heavens and earth) and everything in it. Being a servant (human) is encouraged to study and practice His teachings because there is no doubt that life has had roles and responsibilities since ancient times through technological advances until the end of time (Maslan et al., 2021), as the word of Allah SWT in Al-Qur'an letter Shad verses 87-88:

إِنْ هُوَ إِلَّا ذِكْرٌ لِلْعَالَمِينَ ﴿٨٧﴾ وَلَتَعْلَمُنَّ نَبَأَهُ بَعْدَ حِينٍ ﴿ ٨٨﴾

Meaning: "This (Al-Qur'an) is nothing but a warning to all nature and indeed, you will know (the truth) of its message (Al-Qur'an) after some time."

The presence of chlorophyll or green leaf substance used in the process of photosynthesis is a characteristic of plants. The ability to breathe or breathe is one of the characteristics of life that must exist in every living thing. The process of breathing is also carried out by plants, as well as by other living things. Stomata, lentic cells, and root tips are respiratory organs found in plants. Since respiration is essential to plant life, plants would experience physiological decline without it (Novitasari, 2017). The Qur'an says in QS Yunus verse 24:

إِنَّمَا مَثَلُ الْحَيَاةِ الدُّنْيَا كَمَاءٍ أَنْزَلْنَاهُ مِنَ السَّمَاءِ فَاخْتَلَطَ بِهِ نَبَاتُ الْأَرْضِ مِمَّا يَأْكُلُ النَّاسُ وَالْأَنْعَامُ حَتَّىٰ إِذَا أَخَذَتِ الْأَرْضُ زُخْرُفَهَا وَازَّيَّنَتْ وَظَنَّ أَهْلُهَا أَنَّهُمْ قَادِرُونَ عَلَيْهَا أَتَاهَا أَمْرُنَا لَيْلًا أَوْ نَهَارًا فَجَعَلْنَاهَا حَصِيدًا كَأَنْ لَمْ تَغْنَ بِالْأَمْسِ ۚ كَذَٰلِكَ نُفَصِّلُ الْآيَاتِ لِقَوْمٍ يَتَفَكَّرُونَ ﴿٢٤﴾

Meaning: "Indeed, the parable of worldly life is like water (rain) that We send down from the sky, then it grows abundantly because the water is the plants of the earth, some of which are eaten by humans and livestock. Until when the earth is perfect in its beauty, and wears (also) its ornaments, and its owners think that they must have mastered it, suddenly Our punishment comes to it at night or day, then We make it (plants) like plants sickle, as if it had never grown yesterday. Thus We explain (Our) signs to people who think."

Plant metabolic processes include respiration, photosynthesis, and transpiration. The process by which plant tissues lose water in the form of water vapor through the stomata is known as transpiration (Ternate, 2014). As long as the plant is there, it will be. The benefits of this cycle are accelerating the rate of transport of nutrients through the root xylem vessels, compensating for the swelling of plant cells so that their conditions remain ideal and as an effort to maintain leaf temperature stability (Anggraini & Apep, 2022).

The presence of chlorophyll or green leaf substance used in the process of photosynthesis is characteristic of plants. One of the many aspects of a perfect life is breathing or respiration. The process of breathing is also carried out by plants, as well as by other living things. Stomata, lentic cells, and root tips are respiratory organs found in plants. Without breath, plants will experience a physiological collapse because breath is an important cycle for vegetation (Alim et al., 2020). The idea of plant digestion has been studied from the perspective of the Qur'an. As a result, the Qur'an and Hadith will be used in this research to expand the idea of plant metabolism. And in the Al-Qur'an letter Al-Kahf verse 54, Allah says:

وَلَقَدْ صَرَّفْنَا فِي هَٰذَا الْقُرْآنِ لِلنَّاسِ مِنْ كُلِّ مَثَلٍ ۚ وَكَانَ الْإِنْسَانُ أَكْثَرَ شَيْءٍ جَدَلًا ﴿٥٤﴾

Meaning: "And verily, We have explained repeatedly to mankind in this Qur'an with various parables. But humans are indeed the ones who argue the most.

METHODS

In this review, the analysts use a subjective strategy through the idea of plant digestion from the viewpoint of the Qur'an. Researchers use journal articles, books, documents that collaborate with metabolism, and other sources as data sources. The next researcher will record the data obtained in accordance with the discussion and purpose of this study.

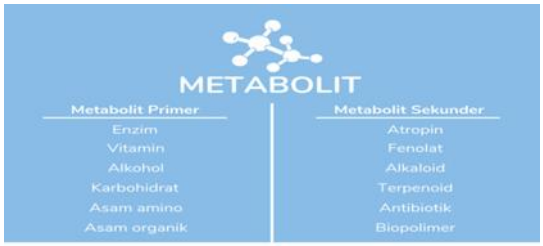
FINDING AND DISCUSSIONS

Understanding Plant Metabolism

The Greek word metabolism, which means "change", refers to all the biochemical reactions that occur in an organism with the aim of sustaining life. Metabolism comes from this word. Regular and specific interactions between molecules in the environment of the cell and changes in those interactions cause chemical reactions (Nurhasanah, 2017). According to one interpretation, metabolism is the rate at

which food is digested, absorbed and assimilated in the body to produce energy. The calorie burning rate increases with an increase in metabolism (Winarti et al., 2019). There are 2 types of metabolic processes, namely primary and secondary metabolism, each type has its own role in plants so that plants can carry out their lives (Novitasari, 2017).

Figure 1. The difference between primary and secondary metabolites



In the Al-Qur'an surah Al-Baqarah verse 168:

s

يٰٓاَيُّهَا النَّاسُ كُلُوْا مِمَّا فِى الْاَرْضِ حَلٰلًا طَيِّبًاۖ وَّلَا تَتَّبِعُوْا خُطُوٰتِ الشَّيْطٰنِۗ اِنَّهٗ لَكُمْ عَدُوٌّ مُّبِيْنٌ

It means: "O people! Eat from (food) that is lawful and good that is found on earth, and do not follow the steps of Satan. Indeed, satan is a real enemy for you.

According to verse 168 of the Al-Qur'an letter Al-Baqarah, Muslims must eat halal food because this food is harmful to their health and will damage the body's metabolic system. In the process of metabolism, there are two types of reactions: catabolism and anabolism. Catabolism is the breakdown of complex atoms into less complex particles. Meanwhile, anabolism is a complex or natural composition of a basic mixture that uses energy (Novitasari, 2017).

Structure of Plant Metabolism

The anatomical structure and physiological processes of plants cannot be separated from the study of the metabolism of natural materials (phytochemicals). Cells are the smallest anatomical structure of plants, and their vacuoles store food reserves in the form of primary or secondary compounds(Dhaniaputri, 2015). The processes of photosynthesis and respiration produce the main metabolites, namely carbohydrates (glucose), proteins, lipids and nucleic acids. The process of glucose metabolism will produce by-products in the form of carbon dioxide (CO2) and water (H2O). Carbon dioxide is obtained from the Citric Acid cycle while water (H2O) is obtained from the electron transport chain process. Through metabolic processes, energy will then be produced in the form of ATP and heat (Novitasari, 2017)

Cellular metabolism is a highly coordinated process that requires the cooperation of several enzyme systems to catalyze reactions step by step and control the reaction mechanism through regulation of metabolism(Sari, 2014).

Photosynthetic reactions in plants are divided into two stages, namely:

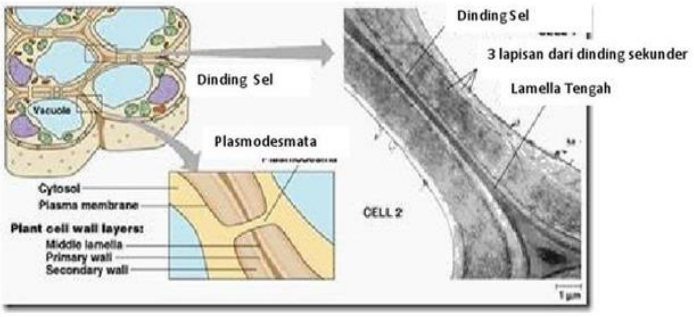
1. Light reaction
2. The light reaction converts sunlight energy into ATP and the chemical energy NADPH (Yustiningsih, 2019).
3. Dark reaction

4. The method by which CO2 is converted to sugar is the dark reaction. The chloroplast stroma contains this component. The dark reaction need not occur in the dark; it's just that the blunt response is autonomous from light (Sumarno, 2015).

Plants are multicellular organisms that are autotrophic, that is, they can make their own food so that they act as producers in the food chain in ecosystems. The science that studies the plant world is called Botany. The studies studied in botany include the shape of plants that appear from the outside (morphology), the structure of the constituent tissues in plants (anatomy), the classification and kinship of plants (taxonomy), the functions and metabolic processes that occur in the plant body (physiology), the interaction of plants with environment (ecology) as well as other more specific studies.

Plants are complex organisms which are composed of cells, a group of cells with the same (almost the same) shape and function forms a network, a group of tissues forms an organ, a group of organs forms an organ system and finally forms an organism (individual). A group of the same organisms will form a population, a group of populations form a community, and these different communities will interact with their environment in an ecosystem

Figure 2. plant metabolic structure



To study the plant world, it is usually started from the cells first, then the tissues that make up the plant body. In this discussion, more emphasis will be placed on the structure of plant cells and tissues (anatomy). The cell is the smallest structural and functional unit in an individual. Plants have a cell wall which makes their outer structure tougher than animal cells. Plant cells have larger vacuoles than animal cells, where one of the functions of this vacuole is to store chemical compounds produced by plants.

Plant Chlorophy

Plants capture light using a pigment called chlorophyll, the pigment that gives plants their green color. Chloroplasts contain a pigment called chlorophyll. It is this chlorophyll that absorbs light to be used in the process of photosynthesis. Even though all the green parts of a plant contain chloroplasts, most of the energy is produced in the leaves. Inside the leaf there is a layer of cells called the mesophyll which contains half a million chloroplasts per square millimeter (Kimball, 1983). Plant cell chloroplasts are flattened structures with an average length of 7 µm and 3 – 4 µm in width (figure). Each is bounded by a pair of smooth outer membranes. This outer boundary

encloses a fluid matrix called stomata and an extended system of membranes. This inner membrane is folded in pairs called lamella (Hidayanti, 2009).

Overall, metabolism is associated with the regulation of the material and energy resources of the cell. Several metabolic pathways release energy by breaking down complex molecules into simpler compounds. This breakdown process is called the catabolic pathway. A major process of catabolism is cellular respiration, in which the sugars glucose and other organic matter are broken down into carbon dioxide and water. After this overhaul, the energy stored in organic molecules can be used to carry out the work of the cell. The anabolic pathway, in contrast, uses energy to build complex molecules from simpler molecules. An example of anabolism is the synthesis of proteins from amino acids. Catabolic and anabolic pathways are up and down hills on the metabolic map, respectively. Metabolic pathways intersect in such a way that the energy released from the “downhill” reactions of catabolism can be used to drive the “uphill” reactions of anabolism. This transfer of energy from catabolism to anabolism is called energy coupling

Plant verses in the Qur'an and their benefits for health

Mentioned in the Qur'an 'Abasa Verse 28:

وَعِنَبًا وَقَضْبًا ﴿٢٨﴾

Meaning: Grapes and vegetables.

The Qur'anic saying: "Inaba and Qadba" also refers to magical self-actualization because "grape" refers to the grape group, which is a complete ranking of important fruit crops, and "grape" is a member of two important families: "The grape family" , which includes 45 streams and 550 species of plants as widespread as grapes, buckthorn, and the "vine family", which includes 11 species and 600 species of grapes, shows that one of these plants is very important. Grapes are also beneficial to facilitate urination and help digestion. Unripe grapes are great for treating sore throats. Grapes are also known to relieve gout, heart disease, and chronic bronchitis pain (Jaronah, 2020).

Allah also said in QS. At-Tin.[95]:.1.

وَالتِّينِ وَالزَّيْتُونِ ﴿١﴾

Meaning: By (fruit) Tin and (fruit) Olives,

Facts about figs: A stew of monoic sugars and starch compounds, figs have up to 53% by weight of carbohydrates, a small amount of protein (less than 3.6 percent) and less salt than potassium and magnesium Phosphorus, iron, copper, zinc, sulphur, sodium, and klooz. They also have a lot of vitamins, enzymes, acids and disinfectants, as well as a lot of fiber (up to 17.5%) and more water (Rifaanudin, 2022).

Plants based on the Qur'an and Hadith

Allah says in (QS. Surah Al An'aam verse 141):

وَهُوَ الَّذِيْٓ اَنْشَاَ جَنّٰتٍ مَّعْرُوْشٰتٍ وَّغَيْرَ مَعْرُوْشٰتٍ وَّالنَّخْلَ وَالزَّرْعَ مُخْتَلِفًا اُكُلُهٗ وَالزَّيْتُوْنَ وَالرُّمَّانَ مُتَشَابِهًا وَّغَيْرَ مُتَشَابِهٍۗ كُلُوْا مِنْ ثَمَرِهٖٓ اِذَآ اَثْمَرَ وَاٰتُوْا حَقَّهٗ يَوْمَ حَصَادِهٖۖ وَلَا تُسْرِفُوْاۗ اِنَّهٗ لَا يُحِبُّ الْمُسْرِفِيْنَۙ

Meaning: And it is He who makes the plants that have vines and those that do not have vines, date palms, plants of various tastes, olives and pomegranates that are similar (shape and color) and dissimilar (taste). Eat its fruit when it bears fruit and give its due (zakat) when it reaps the fruit, but don't overdo it. Verily, Allah does not like those who are excessive.

Earth's natural resources can be used to quantify and meet human needs, but humanity's desire to satisfy all humans will only make matters worse. Islam teaches that everyone should give more than they receive. Nature was created by God in various forms according to the circumstances of society. Moreover, Allah has created according to His dimensions. Nature is able to absorb new pollutants, but if there are a lot of them in a short time, it will not be able to do so (Hidayanti, 2009).

In science, the greenness of this plant is also called green leaf substance (chlorophyll) based on the study of Nasihin and Sirajun. Chlorophyll or leaf green substance is a pigment that is owned by various organisms and is one of the important molecules in the process of photosynthesis. It is this substance that gives the green color to the leaves of green plants and green algae and various other algae. In the world of modern health, chlorophyll has been used as a supplement to improve health and immunity against disease so that it can be produced and traded for buying and selling in various countries so that it becomes a source of income that can improve the welfare of the world's population who have the creativity and knowledge to develop it (Zaini, 2022) .

Everything we talked about above, has been explained by the Koran in the last 14 centuries ago. Allah SWT says in surah Ar-Ra'd verse 4: "And in this earth there are adjoining parts and vineyards, plants and date palms that have branches and those that do not have branches, watered with the same water. We are exaggerating some of these plants over others in terms of taste. Indeed, in that there are signs (the greatness of Allah) for people who think." Based on the verse above, the advantage possessed by one of the plants in selecting the elements of the food ingredients it absorbs affects the taste, quality, and color of the fruits it produces.

CONCLUSION

Plant metabolism is a chemical process that plays a role in the production of energy for life activities. According to Al-Baqarah verse 164 of the Qur'an, Allah sends down water from the sky to revive various types of plants following the creation of the vastness of the heavens and the breadth of the earth. Plant cell respiration is a complicated process that starts with glycolysis, Krebs cycle and electron transport. After that, energy in the form of ATP is generated. Mitochondria in cells are responsible for the production of ATP and are where the process of cellular respiration takes place.

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REFERENCE

Alim, N., Ritonga, M., & Mafardi, M. (2020). Korelasi Kegiatan Ekstrakurikuler Sanggar Al-Quran dengan Hasil Belajar Al-Quran Hadits di MAN 4 Pasaman Barat [Correlation of Al-Quran Studio Extracurricular Activities with Learning Outcomes of Al-Quran Hadith at MAN 4 West Pasaman]. *Intiqad: Jurnal Agama dan Pendidikan Islam*, *12*(2), 246–255. https://doi.org/10.30596/intiqad.v12i2.4640

Anggraini, P. M., & Apep, S. (2022). Metabolisme dalam Perspektif Al-Qur'an [Metabolism in the Perspective of the Qur'an]. *Journal of development dan research in education*, *2*(1), 36–44.

Dhaniaputri, R. (2015). Mata kuliah struktur dan fisiologi tumbuhan sebagai pengantar pemahaman proses metabolisme senyawa fitokimia [Plant structure and physiology courses as an introduction to understanding the metabolic processes of phytochemical compounds]. *Prosiding Seminar Nasional Pendidikan Biologi*, *4*(1), 636–645. https://biology.umm.ac.id/files/file/636-645 Risanti Daniaputri.pdf

Hidayanti, S. R. (2009). Analisis Karakteristik Stomata, Kadar Klorofil Dan Kandungan Logam Berat Pada Daun Pohon Pelindung Jalan Kawasan Lumpur Porong Sidoarjo [Analysis of Stomata Characteristics, Chlorophyll Content and Heavy Metal Content in Tree Leaves Protecting the Road in the Porong Sidoarjo Mud Area]. *Fakultas Sinstek Dan Teknologi Universitas Islam Negeri Malang Malang*, 1–64. http://etheses.uin-malang.ac.id/995/1/02520020 Skripsi.pdf

Jaronah, S. (2020). Tumbuhan sebagai sumber gizi dalam tafsir kementrian agama [Plants as a source of nutrition in the interpretation of the Ministry of Religion]. *Uin Syarif Hidayatullah*, 51.

Maslan, M., Muzakki, A., Duhita, M. R., & Hafsan, H. (2021). Kajian Tematik Air Pada Siklus Air Menurut Perspektif Sains Dan Al-Quran [Thematic Study of Water in the Water Cycle According to the Perspective of Science and the Koran]. *Teknosains: Media Informasi Sains Dan Teknologi*, *15*(2), 197. https://doi.org/10.24252/teknosains.v15i2.19579

Novitasari, R. (2017). Proses Respirasi Seluler Pada Tumbuhan [Cellular Respiration Process In Plants]. *Prosiding Seminar Nasional Pendidikan Biologi dan Biologi*, 89–96. http://seminar.uny.ac.id/sembiouny2017/sites/seminar.uny.ac.id.sembiouny2017/files/B 12a.pdf

Nurhasanah, N. (2017). Pengembangan Media Pembelajaran Berupa Komik Biologi (Kombi) pada Materi Metabolisme untuk Siswa Kelas XII SMA [Development of Learning Media in the Form of Biological Comics (Kombi) on Metabolism for Class XII High School Students]. https://repository.unja.ac.id/2852/%0Ahttps://repository.unja.ac.id/2852/1/ARTIKELNURH ASANAH %28RSA1C411017%29.pdf

Rifaanudin, M. (2022). *Manfaat Tumbuhan Dalam AL-Qur,an [Benefits of Plants in the Qur'an]*. *2*(1), 87–100.

Sari, E. K. (2014). Metabolisme Hewan dan Tumbuhan [Animal and Plant Metabolism]. *Fakultas Matematika dan Ilmu Pengetahuan Alam: Universitas Lampung*.

Sumarno, E. (2015). Laporan Praktikum Silvika IV. Fotosintesis. [Silvika IV Practicum Report. Photosynthesis]. *Journal of Chemical Information and Modeling*, 1–18.

Winarti, R., Masriani, & Sartiks, R. P. (2019). Pengembangan Modul Biokimia II Pada Materi Metabolisme Karbohidrat Untuk Mahasiswa Pendidikan Kimia Universitas Tanjungpura [Development of the Biochemistry Module II on Carbohydrate Metabolism Material for Chemistry Education Students at the University of Tanjungpura]. *Jurnal Pendidikan dan Pembelajaran Khatulistiwa (JPPK)*, *8*(1), 1–10.

Yustiningsih, M. (2019). Intensitas Cahaya dan Efisiensi Fotosintesis pada Tanaman Naungan dan Tanaman Terpapar Cahaya Langsung [Light Intensity and Photosynthetic Efficiency in Shade Plants and Plants Exposed to Direct Light]. *Bio-Edu: Jurnal Pendidikan Biologi*, *4*(2), 44–49. https://doi.org/10.32938/jbe.v4i2.385

Zaini, N. S. M. (2022). Kajian Tematik Konsep Makanan Berasaskan Tumbuhan dalam Ayat Surah Al-an'am Berdasarkan Kitab Tafsir Mafatihul Ghayb [Thematic Study of the Concept of Plant-Based Food in the Verses of Surah Al-an'am Based on the Book of Tafsir Mafatihul Ghayb]. *18*(2), 176–190.