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Scientific Interpretation of "Fertilizing Winds" Mentioned in Verse 15:22 of Al-Quran

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***Abstract*—**Allah (SWT) bestowed us with the Divine blessing, providing the wonderful source of water as stated in verse 15:22 of Al-Quran. Arabic "Ar-Riaaha Lawaaqiha (ٱلرِّيَٰحَ لَوَٰقِحَ)" of this verse is translated as "fertilizing winds." The "fertilizing winds" literally, refer to the winds having the roles: to fertilize something similar to the "zygotes" in humans and animals (formation of clouds in the sky in this case); to produce fertilizers for the plants, crops, etc.; and to pollinate the plants. In this paper, these roles of "fertilizing winds" have been validated by presenting the modern knowledge of science in this regard. Existing interpretations are mostly focused on the "formation of clouds in the sky" while few of them mention about the pollination of trees. The production of fertilizers, in this regard, may also be considered for the interpteration of this verse. It has been observed that the winds contain the necessary components of forming the clouds; the necessary components of producing the fertilizers; and the necessary components to pollinate the plants. The science of meteorology gives us a clear understanding of the formation of clouds. Moreover, we know that the lightning bolts break the nitrogen molecules of winds and the water molecules of vapor to form fertilizers. Pollination is a common role of winds in plant fertilization. All the scientific phenomena presented here give us better interpretations of "fertilizing winds."

***Keywords*—**Al-Quran, fertilizing winds, meteorology, cloud droplets.

I. Introduction

ALLAH (SWT) mentioned many names and words in the different verses of Al-Quran, of which people had no idea at the time of the revelation and even for many centuries after the revelation of this divine Scripture. The translations and interpretations of the Al-Quran began several centuries before the discovery of various scientific knowledge and phenomena. The interpreters then started to include available scientific knowledge in their interpretations of the relevant verses.

Allah (SWT) stated in verse 15:22 of Al-Quran: "And We have sent the fertilizing winds and sent down water from the sky and given you drink from it. And you are not its retainers [1]." Allah bestowed us with the Divine blessing, providing a wonderful source of water as stated in this verse. His blessing of water is not only for the human beings but also for the animals, plants, and other creatures living on the Earth, as we see in some other verses of Al-Quran. Stated in the verses 16:10-11[2], [3] that: "It is He who sends down rain from the sky, from it is drink and from it is foliage in which you pasture. He causes to grow for you thereby the crops, olives, palm trees, grapevines, and of all the fruits. Indeed, in that is a sign for a people who give thought." Similar verses are 25:48-49 [4], [5]: "And it is He who sends the winds as good tidings before His mercy [i.e., rainfall], and We send down from the sky pure water. That We may bring to life thereby a dead land and give it as drink to those We created of numerous livestock and men."

The Arabic words "Ar-Riaaha Lawaaqiha (ٱلرِّيَٰحَ لَوَٰقِحَ)" of verse 15:22 are translated by many interpreters as "fertilizing winds."

We may go through the literal meaning of the Arabic phrase "Ar-Riaaha Lawaaqiha (ٱلرِّيَٰحَ لَوَٰقِحَ)" to indentify its roles. "Lawaaqiha; fertilizing" qualifies the word "Ar-Riaaha; winds," of this verse. The "Lawaaqiha" is also translated as fecundating [6], and impregnating [7] which are synonyms of fertilizing. Allah (SWT) sends the winds of having these characteristics and sends down rain from the sky. Taking all the translations into account, the "fertilizing winds," literally, refer to have the following three roles:

- to fertilize two substances and form a new substance (formation of clouds in this case) similar to the "zygotes" as created in the case of humans and animals;
- to produce fertilizers for the plants, crops, etc.; and
- to pollinate the plants.

It is to be noted that, Allah (SWT) stated first, "And We send fertilizing winds" and next, "and (We) sent down water from the sky." It is obvious that the sky has to be filled with clouds before sending down water from the sky. So, there is a linkage between the statement of the verse: "We send fertilizing winds," and the "formation of clouds in the sky." And this linkage is clearly mentioned in the verse 30:48 of Al-Quran [8]:

> "It is Allah who sends the winds, and they stir the clouds and spread them in the sky however He wills, and He makes them fragments so you see the rain emerge from within them. And when He causes it to fall upon whom He wills of His servants, immediately they rejoice."

The objective of this research work is to find all possible interpretations of "fertilizing winds" with the help of modern scientific knowledge. The roles of "fertilizing winds" have been identified according to the literal meaning of the word "fertilizing." Existing interpretations of "fertilizing winds," regarding verse 15:22 of Al-Quran, have been studied and compared with the mentioned roles presented here. It has been observed that the existing interpretations do not explain all the identified roles of "fertilizing winds." Various scientific phenomena relevant to the "fertilizing winds" have been studied and presented in this paper. These scientific phenomena, presented here, give us a better interpretation of "fertilizing winds" as mentioned in verse 15:22 of Al-Quran.

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II. Existing Interpretations

The existing translations and interpretations of "fertilizing winds" mostly focus on the "formation of clouds in the sky and rain [9]-[11]," and do not focus on the fertilizer production issue." Some explain it as "fertilizing the clouds into rain [12], [13]." Others interpret it as "the winds impregnated by rain or the winds having clouds and rain in it [14]-[16]." Tafsir Ibn Kathir and Tafsir Maariful Quran interpret it the better ways as compared to all other existing interpretations.

A. Ibn Kathir

Regarding the interpretations of "fertilizing winds," Tafsir Ibn Kathir reported not only Ibn Kathir's own comments but also the comments and opinions of some other scholars [17]. According to Ibn Kathir, the winds fertilize the clouds so that they give rain, and fertilize the trees so that they open their leaves and blossom. The plural form of winds mentioned here because they give results.

In reference to opinions of Abdullah bin Mas`ud, Ibn `Abbas, Ibrahim An-Nakha`i and Qatadah, Ibn Kathir reported: "The wind is sent bearing water from the sky, then it fertilizes the clouds until rain begins to generously fall, just as the milk of the pregnant camel flows generously." [17].

This Tafsir also mentioned the comments of `Ubayd bin `Umayr Al-Laythi: "Allah sends the wind which stirs up the earth, then Allah sends the wind which raises clouds, then Allah sends the wind which forms clouds, then Allah sends the fertilizing wind which pollinates the trees." [17].

B. Maariful Quran

Tafsir Maariful Quran interprets the verse 15:22 under the title "the unique divine arrangement of water supply" for the inhabitants of earth. It mentioned that Allah (SWT) has given a hint in this verse about how the water from the sea is delivered to human beings, animals, birds, etc.

Tafsir Maariful Quran reported, "Divine power has set in motion its unique system of delivering water from the sea all over the earth by creating vapors in the sea. Water vapors generate the substance of rains and the winds transform it into clouds making them as mountain-like planes laden with water. These giant planes carrying their cargo of water reach every corner of the world where it must reach, under Divine command, whereby these gigantic auto planes would rain down a specific quantity of water over a specific area of the earth, as commanded [18]."

C. Summary of Existing Interpretations

All interpretations about the "fertilizing winds" are summarized as the winds that:

- fertilize the clouds into rain,
- fill the clouds with water,
- were impregnated by rain,
- have clouds and rain in it,
- get fertilized and become full of water,
- stir up the earth,
- raise water vapors
- raise clouds,
- form clouds, and
- pollinate the trees.

All these interpretations are mostly relevant to the "formation of clouds and rain" with few exceptions of mentioning to pollination of the trees. Recently "formation of clouds" has been explained according to the Science of Meteorology through some electronic media [19], [20]. The scientific phenomena, the production of fertilizers by winds during lightning, may also be taken into account for the interpretation of this verse.

III. Meteorology on Fertilizing Winds

The Science of Meteorology gives us a clear understanding of the formation of clouds and rain. Moreover, we know that the lightning bolts cause the chemical change of nitrogen molecules of winds, and the water molecules of vapor to form fertilizers. It is to be noted that lightning is also caused by winds in storms. Pollination of plants by winds is also a well-known scientific phenomenon. Through the perusing of these scientific phenomena, we have found scientific interpretations of "fertilizing winds."

The mixture of gases that makes up the Earth's atmosphere is known as air. Nitrogen makes up 78% of this gas, which is mixed with oxygen (21%), water vapor (variable), argon (0.9%), carbon dioxide (0.04%), and trace gases. We know that water present in oceans and rivers evaporates during summer and escapes into the air. Thus, water vapor is one of the components of the air. It occupies a very small percentage of the Earth's atmosphere. Smoke is present in our atmosphere due to the burning of fuels as well as because of volcanoes, coal-burning furnaces, etc. Apart from these, dust particles are also present in our atmosphere which we observe when we see a ray of light in a dark room. Smoke and dust particles occupy less than 1% of the earth's atmosphere. Other particles like dust and smoke; pollen, dirt, and sea salt (from breaking ocean waves) are also found suspended in the air [19].

We may clarify the difference between wind and air. The wind is nothing but the moving air. The movement of air is usually caused by the uneven heating of the Earth by the sun and the Earth's own rotation. The pressure difference between the two places also causes the air to move. According to nature and behavior, the winds are classified as, light breezes, hurricanes, tornadoes, and thunderstorms. It has been observed that the winds contain the necessary components:

- for forming the clouds,
- for producing the fertilizers, and
- for pollination of the plants.

IV. Formation of Cloud Droplets, Clouds and Rain

The winds have an important role in forming clouds as it carries water vapor from seas and oceans to the upper layers of the atmosphere. However, the water atoms of vapor have to be collected and condensed to form clouds. Dust particles provide a surface for the water vapors present in the atmosphere to condense. Each particle of dust works as a "nucleus" for the water vapors to be condensed onto it to form a "cloud droplet" as shown in Fig. 1. However, a dust particle can only serve as a

"nucleus" for the condensation of water vapors if the size of the particle is around 0.2 microns. The dust particle is then called a condensation nucleus; the plural form is nuclei, and is scientifically named, "Cloud Condensation Nuclei" abbreviated as "CCN." The size of a cloud droplet is around 100 times the size of a CCN [20].

Just like the nucleus is the core or center of a cell in biology, the cloud nucleus is the center of a cloud droplet. The formation of a "cloud droplet" can be compared to the formation of a "fertilized egg" by the penetration of a male gamete (sperm) to a female gamete (egg) in case humans and animals as well as pollination of a pollen and a stigma in case of plants.

Other solid particles similar to dust; pollen, dirt, smoke, and sea salt also act as nuclei for the formation of cloud droplets. However, these particles can only serve the purpose of CCN if they are available in proper sizes (0.2 microns). A bunch of cloud droplets get together and form the clouds. When the clouds no longer can hold these water vapors because of saturation, then they fall on the earth in the form of rain.

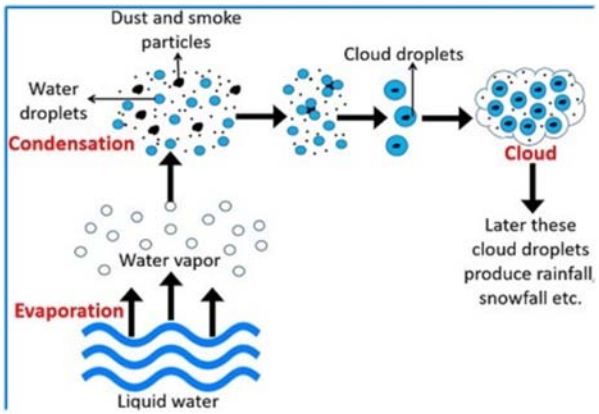

Fig. 1 Formation of Clouds

V. Production of Fertilizers

Nitrogen is an important nutrient for plants to grow. Nitrogen fertilizers are the most common fertilizers that we use nowadays. It is to be noted that nitrogen is the most abundant gas in the Earth's atmosphere, compared to other components, such as oxygen, hydrogen, carbon dioxide, etc. However, despite its abundance in nature, atmospheric nitrogen (N_2) is not readily acceptable to most lifeforms as fertilizers. This is because it is available only in tightly bonded form and is not very reactive with other molecules. With few exceptions, the living things require nitrogen to be transformed into more reactive compounds such as nitrates (NO_3) or ammonia (NH_3) before they can be used as fertilizers.

The lightning bolt generates tremendous heat in its path and surrounding area. The heat generated by the lightning bolt breaks the strong bond of nitrogen molecules to free up its nitrogen atoms (Fig. 2). It also breaks the water molecules into vapor and raindrops and separates hydrogen and oxygen atoms. The free nitrogen atoms can then bond with oxygen atoms to form nitrogen oxides. It then dissolves into raindrops and becomes nitrates. The free nitrogen atoms may also bond with hydrogen atoms to form ammonia. These two nitrogen compounds are soluble and fall to the ground with rainfall. Lightning, thus, produces natural fertilizers for grass, herbs, crops, and other plants [21].

Fig. 2 Lightning-Produced Fertilizer

A. Winds Cause Lightning

In a thunderstorm, the updrafts of winds cause the ice crystals and the liquid water drops to rub against one another. As a result, electrons are stripped off and the particles become either negatively or positively charged. The charges get grouped in the clouds and form oppositely charged regions. Usually, the negatively charged region is near the bottom of the cloud and the positively charged region is up high. Two separated charged regions create an electric field. As the air is a good insulator, this electric field becomes incredibly strong.

With further increase of charge build up in the two layers of clouds, the electric field between them becomes strong enough to break the insulating capacity of the air. There is a rapid discharge of electricity that causes the flash of lightning. The temperature in the path of a lightning bolt is suddenly increased because of this event. The rapid discharge of electricity temporarily neutralizes the charged regions in the atmosphere, and the charges build up again [22].

VI. Pollination by Winds

Pollination refers to the process of transferring pollen grains from the male anther of a flower to the female stigma. Pollen grains are transmitted by winds, water, birds, bees, insects, butterflies, bats, etc [23]. We know that pollen grains from the flowers, carried by the winds, are suspended in the atmosphere for a longer period. Some of them act as CCNs during the formation of cloud droplets in the upper atmosphere. The pollen grains transported by winds, in the lower atmosphere, cause the role of wind-pollination of plants (Fig. 3).

It is to be noted that Allah (SWT) has made the physical characteristics of wind-pollinated flowers a little different than other flowers. The anthers (male parts) of these flowers are specially designed to expose pollen so that the winds can blow the pollen easily. The stigmas (female parts) are long, feathery, and ideally adapted to catch the pollen blown by the winds. Wind pollination may occur via insects. The pollen can stick to the furry coat of a flying bee. This bee, when sit on a stigma of the same flower species, may cause the pollination. Many of the

world's most important crop plants are wind-pollinated. These include wheat, rice, corn, rye, barley, and oats. Many economically important trees are also wind-pollinated. These include pines, spruces, firs, and many hardwood trees, including several species cultivated for nut production [24].

Fig. 3 Wind Pollinated Flowers [25]

VII. Conclusion

Allah (SWT) sends fertilizing winds and brings down water from the sky. The roles of the fertilizing winds have been identified and presented in this paper. Existing interpretations (Tafsirs) have not explained all the roles of the fertilizing winds. After going through a number of scientific phenomena, relevant to the verse-15:22 of Al-Quran, we have found three scientific interpretations of fertilizing winds:

1. it fertilizes the two of its components, 'cloud condensation nuclei (CCN)' and 'water vapor' to form 'cloud droplets' and then assembles the cloud droplets into clouds and then brings down rain from the clouds;
2. it produces fertilizers; nitrates and ammonia, through a series of chemical reactions of nitrogen, oxygen, and hydrogen, after breaking of the chemical bonds of nitrogen molecules by lightning bolts; and
3. it helps the pollination of a pollen and a stigma in the case of plants.

It may be noted that according to verse 15:22, Allah (SWT) sends down water from the sky for us to drink. It seems to be unnecessary here to include the second interpretation of the fertilizing winds. However, Allah (SWT) stated in other verses that, by sending down rains, He causes to grow of foliage, crops, plants, fruits, etc. Hence, the second interpretation, that it produces fertilizers, may have to be taken into account. The third interpretation is the very common role of winds but not linked with clouds and rain.

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- https://climatekids.nasa.gov/;
- https://www.pbslearningmedia.org/;
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