

## The effect of the Qur'an verse on inhibiting the growth of molds *in vitro* and *in vivo* conditions

Bibi Marzieh Razavizadeh<sup>1\*</sup>, Dina Shahrapour<sup>2</sup>

1. Department of Food Chemistry, Research Institute of Food Science and Technology (RIFST), Mashhad, Iran.
2. Department of Food Safety and Quality Control, Research Institute of Food Science and Technology (RIFST), Mashhad, Iran.

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### Abstract

**Background and Objective:** Acoustic waves, particularly ultrasound, are commonly used in food processing to reduce the activity of microorganisms in food. This study aimed to investigate the effect of a verse from the holy Qur'an, specifically Al-An'aam (Sura 6: Verse 18 (6:18)), on the inhibition rate of molds in both *in vitro* and *in vivo* conditions.

**Materials and Methods:** The study evaluated the effects of both the written verse and the sound waves of Tar instrument music, based on the weight and syllables of Al-An'aam Sura (verse 18) without the sound of Qur'an, throughout 1 to 5 days on the growth of *Aspergillus niger* and *Botrytis cinerea* at 25 °C. Additionally, the population of molds on the surface of strawberries inoculated with fungal spores was determined under cold conditions (5 °C) for 10 days.

**Results and Conclusion:** The results showed a significant decrease in mold diameter growth after 96 and 120 h in the written verse treatment group compared to the control. The minimum mold growth diameters for *A. niger* and *B. cinerea* in this group were 3 and 3.7 cm, respectively. Furthermore, the microbial load on inoculated strawberries with *A. niger* and *B. cinerea* decreased by 44% and 50%, respectively, after six days of treatment compared to the control, and no sign of microbial spoilage was observed on day 10. Interestingly, the emergence of first spoilage symptoms on the inoculated strawberries with *B. cinerea* spores increased by 42% under the treatment of Tar sound compared to the control. In the case of *A. niger*, it increased by 17% in the treatments with the Qur'an verse label compared to the control.

**Keywords:** Acoustic waves, *Aspergillus niger*, *Botrytis cinerea*, Qur'an

### 1. Introduction

The importance of healthy food storage for human life is undeniable [1]. The consequences of spoilage and pollution can lead to the emergence of conditions in food that, if consumed, can have immediate or long-term adverse effects on human health. This underscores the urgency of understanding and preventing food spoilage [2-4]. The consumers' awareness of food spoilage factors is crucial. Understanding these factors empowers them to take

the most appropriate measures to control spoilage and putrefaction, ensuring the safety of the foods. This may involve the use of approved chemicals to extend shelf life or the application of non-destructive physical methods [5,6].

Fruits and vegetables, once harvested, spoil rapidly, with a short shelf life. This rapid spoilage not only diminishes the quality of the product, but can also lead to human poisoning and illness. Under-

\*Correspondence to: Bibi Marzieh Razavizadeh; E-mail: [m.razavizadeh@rifst.ac.ir](mailto:m.razavizadeh@rifst.ac.ir); Tel: +98-513-5425327; Fax: +98-513- 5425406

standing and addressing this issue, particularly the role of fungal agents, is of immediate importance [5,7]. Among them, *Aspergillus niger* (or black mold) and *Botrytis cinerea* (or gray mold) are the most common cause of spoilage of fruits and vegetables. These molds thrive in damp conditions and can quickly spread, leading to the decay of the entire batch of produce [8-10].

Words are one of the most powerful forces available to humankind [11]. It possesses the ability to either build or destroy, wielded by individuals. Infused with passion and energy, words can mend wounds, deter actions, inflict harm, be demeaning, and, conversely, inspire positive transformations. In everyday literature, the semantic load of words is categorized into three groups: positive, neutral, and negative [11]. Semantic load implies that when a statement is spoken, heard, or read, it creates cultural and emotional associations. Masaru [12], a Japanese researcher, claimed that metaphysical and spiritual concepts affect water's molecular structure. Indeed, the vibrational energy of humans, thoughts, opinions, music, and prayer affect the structure form of water. In other words, the environmental vibrations change the molecular shape of water. Other researchers reported similar conclusions [13-15].

In recent decades, sound waves, including both acoustic and ultrasound, have been utilized as mechanical forces in the field of food processing and preservation to reduce the activity of specific microorganisms [3,4,16-19]. Sound waves originate from the oscillation of elastic materials and the vibrations induced by air molecules [20-22]. Music may consist of regularly vibrating sound waves, known as tones, or irregularly vibrating waves, characterized as noise [20]. On the other hand, the literature reviewed showed few studies on the effect of written words or phrases on the growth inhibitory of microbes. However, in the last study, we studied the word concept's effect on the fungi's inhibition growth [23].

Recently, there has been a surge of interest in the novel application of musical sounds and the sound

of the Qur'an in diverse fields such as medicine, plant growth, and the study of microorganisms [24-28]. For instance, the effect of sound stimulation using Qur'an verses including An-Nahl (16:10-11), Al-An'aam (6:99), Al-An'aam (6:141), Az-Zumar (39:21), and Abasa (80:24-32) on the growth and yield of grey oyster mushroom (*Pleurotus sajor-caju*) and white oyster mushroom (*Pleurotus florida*) was investigated by Roshita and Ain [29]. Their findings revealed that sound treatment using Al-An'aam (6:141) induced the most significant growth and production of oyster mushrooms (*Pleurotus sp*). Chaidir et al. [26] delved into the impact of the sound of Qur'an recitation (Surah Al-Fatihah) on *Chrysanthemum* plants exposed to an average frequency of 1237.8 Hz for 2 h for 8 weeks. The results demonstrated that Qur'an recitation influenced plantlet height after 2 weeks.

Unlike ultrasound, there are very few studies on the application of acoustic waves to control the quality and increase the shelf life of food. Therefore, the objective of the present study was to investigate the effect of holy Qur'an verse taken from (Al-An'aam (6:18)) [30] as a type of sound wave and as a label on inhibition of *A. niger* and *B. cinerea* inoculated in the culture medium (*in vitro*) and on the surface of inoculated strawberry (*in vivo*). This study underscores the need for further research in this promising area.

## 2. Materials and Methods

### 2.1. Materials

The culture media of potato dextrose agar (PDA) from BioMark (USA) and peptone salt medium from Ibresco (Iran) were obtained. The strawberry fruit was procured from a greenhouse near Mashhad (Iran). The molds *A. niger* (KY695465) and *B. cinerea* (ATCC 46522) were provided by the Microbial Bank of the Research Institute of Food Science and Technology (Mashhad, Iran).

### 2.2. Methods

The molds were grown on the surface of PDA medium at 25 °C [10]. A blank disk (6 mm diameter, Pad-tan Teb Company, Iran) containing PDA medium

was positioned at the center of sterilized plates (8 cm diameter). After preparing the active spores, 25  $\mu$ l of the fungi spore suspension ( $10^4$  CFU/ml) was purred on the disk. The plates were transferred to the incubator at 25 °C for five days (120 h). The growth diameter of the molds was read at time intervals of 24, 48, 72, 96, and 120 h. In addition to the control, two treatments were used in this study. In the first treatment, a Qur'an verse (Al-An'aam (6:18)) was pasted as a label on the top and bottom of the plates.

In the second group, sound of a Tar instrument played in Mahoor tuning was induced align with the tone and weight of the Qur'an verse. Sound Analyzer App as a Sound Level Meter (SLM) and a Real-time Audio Analyzer (RTA) were used to measure and analyze the sound frequency. Environmental noise was used to determine the dominant frequency. Accordingly, in the frequency range of 125 to 8000 Hz, the dominant frequency of the Tar sound was obtained at 4500 Hz. The sound was played for 24 h inside the incubator by the KMplayer software at a sound pressure level of  $75 \pm 5$  dB. For the control group, no sound or label was applied. Each treatment was repeated in three replications.

Strawberry fruit samples of almost the same size and weight (height: 4-5 cm, width: 2.5-3.5 cm, weight: 20-22 g) were sterilized in sodium hypochlorite solution (0.05%), followed by placing in sterile water. The strawberries, after drying under the sterile condition, were spotted with spore suspension (100 ml) of the molds ( $10^4$  spore/ml) and placed in sterilized containers ( $3 \times 4 \times 6$  cm<sup>3</sup>). Each container had two inoculated strawberries. Considering two treatments (Tar music and label) and the control in three replications, nine containers were prepared for each fungus for each sampling day ( $n = 18$  for both fungi). The containers were examined for 10 days, and one container of each group (control and treatments) was removed for microbial analysis on days 2, 4, 6, 8, and 10. Therefore, 90 ( $18 \times 5$  days) containers were prepared throughout the study. In practice, the prepared samples were

moved to the refrigerator (5 °C).

The sound induction or labeling on strawberry sample packages was conducted in cold conditions for 10 days, and sampling was done on even days (2, 4, 6, 8, and 10). After treatment, 10 g of each strawberry sample was transferred to a Stomacher bag containing 90 ml of dilution solution (physiological saline), and the mixture was homogenized by vortex (SM90, FSA, Iran). For counting the population of molds from the initial dilution, subsequent serial dilutions were prepared, and cultured on the surface of PDA medium followed by incubating at 25 °C for five days. After the incubation period, the number of colonies of *A. niger* and *B. cinerea* grown on the surface of the plates was counted. Those fruits that were not exposed to sound and label were considered as control. One package of each treatment kept in cold conditions until the rotting symptoms (visual observation) on the fruit appeared.

### 2.3. Statistical analysis

All tests were performed in three replicates. A completely random design was applied for the statistical data analysis by Minitab software (version 18.1). Data was analyzed based on a one-way analysis of variance. A comparison of means was made using Tukey's test at 95% confidence level.

### 3. Results and Discussion

Figure 1 shows the plates containing *A. niger* and *B. cinerea* treated by the text of Qur'an verse and the sound of Tar instrument compared to the control. We observed a significant inhibition by the Qur'an verse label and sound. Although, it was clearer in the results presented in Figure 2. Accordingly, for each treatment, the molds' growth significantly changed in diameter with different incubation times. On the other hand, a significant reduction in the growth diameter of *A. niger* during incubation times of 96 and 120 h in the written treatment (label) was observed compared to the sound treatment and the control (Figure 2A). A similar result was also observed in the case of *B. cinerea* (Figure 2B). Despite both treatments had a same semantic load,

the influence of written verse *in vitro* was more pronounced than that of the Tar sound. Further-

more, more sensitivity of *A. niger* than *B. cinerea* was seen in the laboratory.



Figure 1- The images of (a) *A. niger*, and (b) *B. cinerea* in the plates containing PDA culture media treated by the written Qur'an verse (sticker), the sound of Tar instrument, and the control (no treated shown as C).

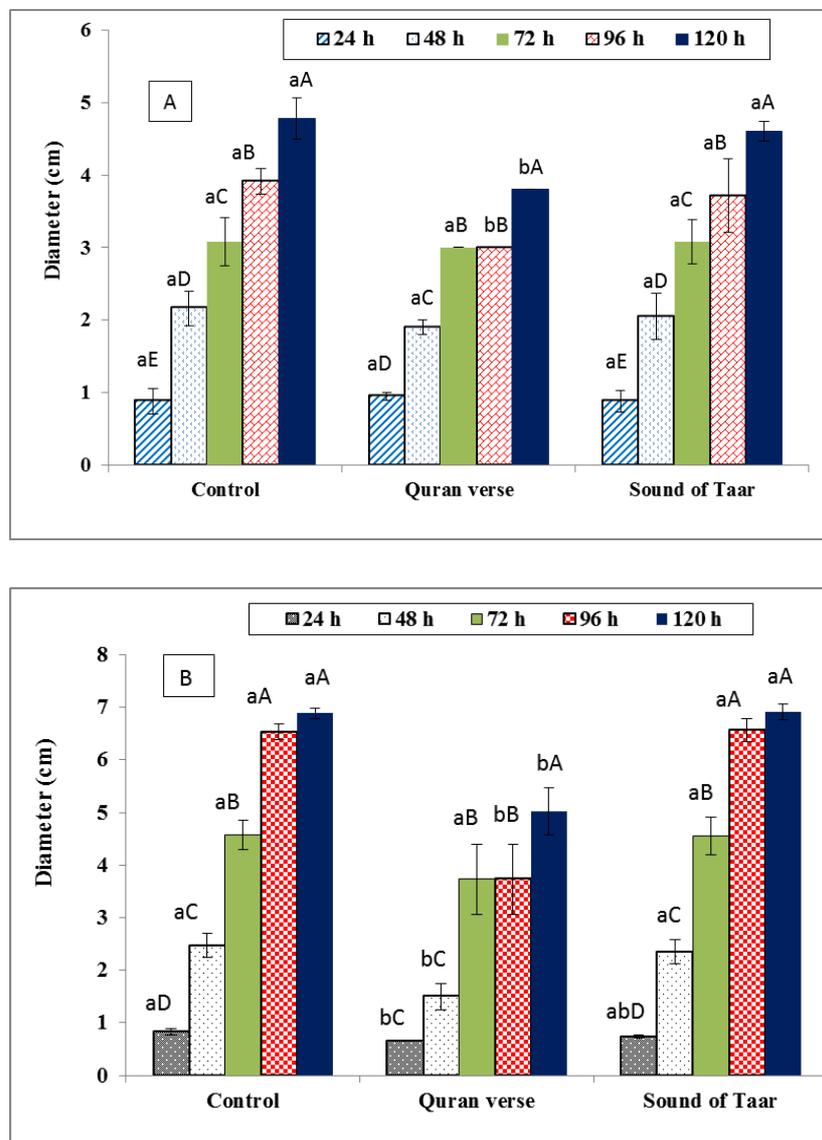


Figure 2- The effect of written verse of Qur'an, and the sound of Tar instrument compared to the control on growth inhibition of *A. niger* (A), and *B. cinerea* (B). Different capital and small letters indicate significant differences in different times and treatments, respectively.

Emoto [12] showed that words, writings, and prayer, which have different meanings, change the structure of water in different ways. Moreover, in a study conducted by researchers on the concepts of words, images, or sounds, it was found that the relationship between abstract concepts and linguistic signs in the emotional system not only signifies the role of human feelings in the emergence, growth, and development of language, but also demonstrates how the sound of words may independently affect our emotions, regardless of their meaning [31]. In the realm of quantum physics, our words are like energetic vibrations that resonate through the fabric of reality, influencing our vibrational frequency. The semantic meaning of these words seems to play a role in the emotions we attach to them [23]. Studies also suggest that a richer emotional vocabulary is strongly linked to lived experiences [32]. In this way, expressing intense negative emotions is often associated with greater psychological distress and poorer physical health. In contrast, words reflecting positive emotions correspond with higher well-being and improved physical health [33]. However, no substantial scientific evidence has supported the idea that words or phrases impact the growth of molds. However, numerous sources discuss the impact of musical sounds and even Qur'an sounds on microorganisms or plants. Karippen et al. [34] reported the highest inhibitory frequency at 15,000 Hz for *A. niger*. Jeong et al. [21] also found the highest inhibition at frequency of 5000 Hz on *B. cinerea*. It has been reported that *Escherichia coli* and *Staphylococcus aureus* exhibited distinct growth rates when exposed to the music of various styles, including 1) Classical "Mozart Symphony No. 40", 2) Bollywood, 3) Indian hymn "Mantra Gayatri", 4) Heavy Metal "Devil's Dance with Metallica", and 5) soundproof enclosure as the "Control" [22].

Roshita et al. [25] studied the effect of different acoustic sound treatments (including thunderstorm, hardcore music, soothing instrumental, Qur'an recital, and control) on the growth and yield of grey oyster mushroom (*Pleurotussajor-caju*). They found that the mycelium growth among different acoustic sound treatments were significantly faster than the control. In summary, these studies indicate that numerous factors, such as the specific type of microorganism, its growth condition, and the nature of the music or composite sounds, each characterized by a unique tone or combination of frequencies and intensities, can influence the ultimate outcome.

The impact of the Qur'an verse (label and Tar sound) on the microbial load of strawberries inoculated with *A. niger* or *B. cinerea* spores is illustrated in Figure 3. Accordingly, for strawberries inoculated with *A. niger* spores during 6-10 days, the treatment with label led to a significant decrease in microbial load compared to the control. The microbial load reduction on day 6 of the treatment was approximately 44% compared to the control, and no sign of microbial spoilage was observed until day 10. In the Tar sound treatment, the microbial load on days 8 and 10 was significantly reduced by 48% and 57%, respectively, compared to the control. Figure 3B presented the results of the strawberries inoculated with *B. cinerea* spores, in which both the labeled and the Tar sound treatments showed a significant decrease in microbial load from days 4 to 10 compared to the control. When treating with the written Qur'an verse, the reduction rate of *B. cinerea* increased from 11% to 50% compared to the control during 2-6 days. In addition, no mold growth was observed on days 8 and 10. In the Tar sound treatment, the reduction of *B. cinerea* increased from 11% to 48% compared to the control between 2 and 10 days.

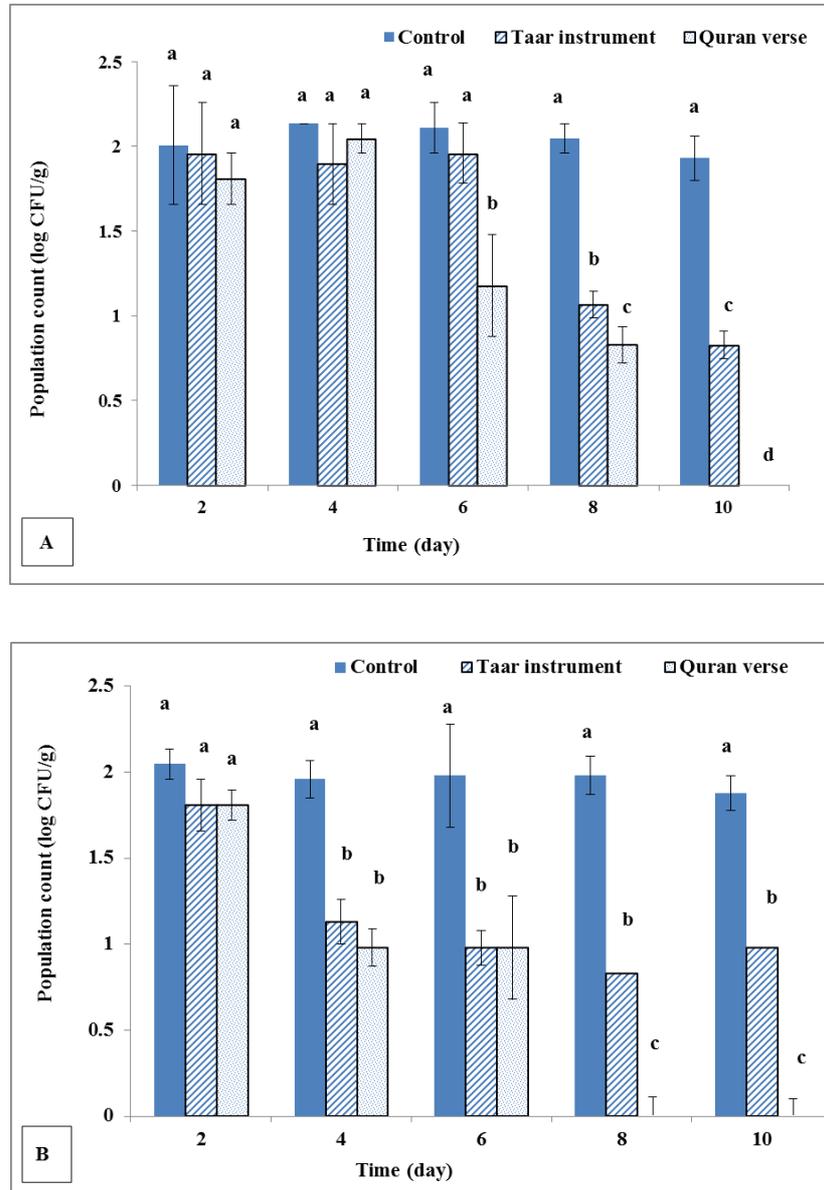


Figure 3- The effect of written verse of Qur'an, and the music of Tar instrument at different times on growth of *A. niger* (A), and *B. cinerea* (B) on the inoculated strawberries stored at 5 °C. Similar letters show no significant difference.

Comparison of Figures 3A and 3B reveals that the effect of the Qur'an verse label was more pronounced than the Tar sound in reducing the microbial load in strawberries. The strawberries were stored in refrigerator after the treatment period until visible signs of mold spoilage were emerged. Since the most significant decrease in microbial load was observed on day 10 in the treatments, the shelf life of the treated strawberries was studied on day 10 accordingly. The effect of the Qur'an verse label and the Tar sound until the emergence

of spoilage sign on the inoculated strawberries is shown in Figure 4. As seen in the figure, the time with no sign of spoilage in the inoculated strawberries treated with the written Qur'an verse and the Tar sound was longer than the control. The shelf life of the inoculated strawberries with spores of *B. cinerea* in the Tar sound treatment was 23 days in comparison to 16 days for the control (significant increase of 42%). While, shelf life of 20 days was achieved for the Qur'an verse label, that was insignificant compared to the control. Further more,

the shelf life of the inoculated strawberries with spores of *A. niger* in the treatments of the Qur'an

verse label was 31 days (significant increase of 17%) compared to the control (26 days).

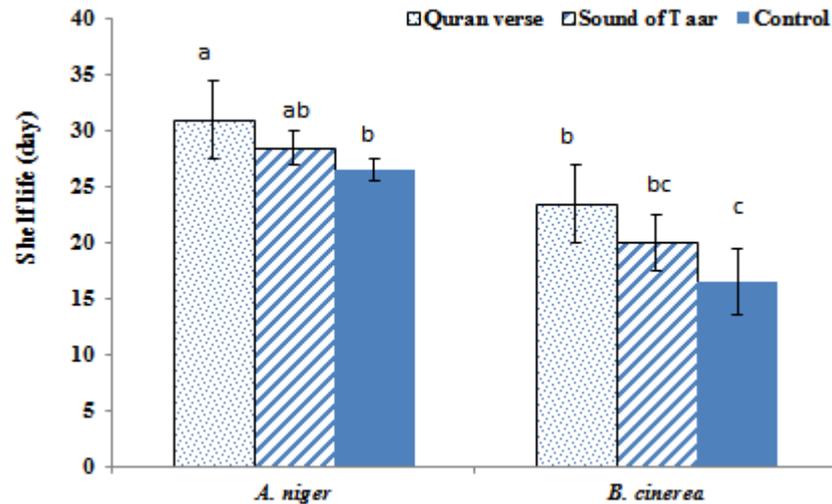


Figure 4- Shelf life of the inoculated strawberries with *A. niger* and *B. cinerea* spores after storage under cold condition (5 °C). Different letters indicate significant differences.

Sound waves have mechanical energy and can be considered as a type of environmental stress that affect the structure of the cell membrane or the function of microorganisms [16,18,35]. On the other hand, sound waves produced from different sources can improve the plant growth and increase its performance [36]. In this regard, Jeong et al. [21] evaluated the inhibited growth of *B. cinerea* by applying sound waves (5 kHz) for 1 to 7 days. They found that sound vibration caused a significant reduction in the germination of *B. cinerea* spores compared to the control. Emoto [12] found that water molecules have memory, and human vibrational energy affects the molecular structure of water. In this regard, epigenetic science proves that the environment, thoughts, behaviors, phrases, and expressions have power, and can affect people's lives [14]. Similarly, our findings for the molds in PDA culture media and inoculated strawberries indicated the different effect of the written Qur'an verse compared to the Tar sound and the control. As a consequence, words not only affect their environment, but depending on their semantic spirit, the impact of words can be even more significant than that of sound waves, to the extent that they

extend shelf life of the products. Furthermore, the findings of the current study revealed that the impact of the Tar sound or the Qur'an verse label on the growth of *A. niger* and *B. cinerea* differed in the PDA culture medium (*in vitro*) and on the inoculated strawberries (*in vivo*). These observations may be attributed to the variations among microorganisms, including differences in shape, DNA, and components. Such distinctions lead to variations in their natural frequencies, which, in turn, can result in their inhibition or destruction under specific frequencies [37-41]. The duration of exposure to the Tar sound wave and the written verse for the treated molds was same as the control. However, as shown in Figures 2 and 3, the written verse had a greater effect on the inoculated strawberries than the Tar sound. However, the influence of the subtle energies of words may increase with prolonged exposure. Nevertheless, the reasons behind these findings and the mechanism by which these energies work still need to be explored, and no reliable scientific documentation has been reported on this subject.

#### 4. Conclusion

The current study suggests that the Qur'an verse presented as the Tar sound or in the written form

with the same conceptual content induces different effects. This disparity in effect is further emphasized by the fact that each musical note induces a distinct wave and frequency. Therefore, energy has a potential to impact the surrounding environment. The written Qur'an verse and the Tar sound influenced the mold growth during 120 h of incubation compared to the control. However, based on the same verse, the sound of the played Tar will likely not convey the same profound essence. On the other hand, the results obtained from this study indicated that the two types of mold responded differently to the same treatment. This serves as evidence that the type of microorganism, its species, structure, environmental conditions, and other factors play a pivotal role in determining the response. To the best of our knowledge, this is the first research that investigated the effect of the holy Qur'an verse on the growth of some fungi. Therefore, the absence of references hinders the ability to compare the results of the current study. However, the ambiguities about how words and sounds affect the environment and microorganisms require more studies, which is expected to open the way for a better understanding of the world's facts with increased public awareness in this field.

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### 6. Conflict of Interest

The authors declare that they have no conflict of interest.

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