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IDENTIFICATION OF ASPERGILLUS SP IN RUJAK SAUCE

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Abstract

Aspergillosis is an infection caused by the fungus Aspergillus Sp and most often occurs in the lungs. It is commonly found in various habitats, usually sporophytes in soil, feed products and stored food. Aspergillus Sp also often contaminates grains, nuts, and their processed products. Factors that cause the growth of Aspergillus Sp. are producers who pay less attention to cleanliness, high humidity and length of storage of materials. The purpose of the study was to identify whether there were fungi Aspergillus sp in Rujak Sauce. This type of research is a descriptive method, to describe a phenomenon that occurs in the community. The population of this study were all Rujak Traders at Pantai Panjang, Kota Bengkulu, which amounted to 21 traders. The results of the study were found 12 samples detected contaminating to the fungus Aspergillus Sp. Factors influencing awareness to maintain the cleanliness of the environment, equipment and materials as well the influence of substrate moisture, temperature and pH of the environment. Recommendation for Rujak sellers are to keep the environment clean and wash the tools used for selling more often and not to store the Rujak sauce for too long with varying temperatures and humidity.

Key Words: *Candida albicans*, Diabetes Mellitus

INTRODUCTION

Fungi are organisms that have true or eukaryotic cells, thread-shaped, branched, not chlorophyll, cell walls contain cellulose, chitin or both, heterotrophs, and most of the body consists of vegetative parts in the form of hyphae and generative parts in the form of spores. Mushrooms have a potential hazard to human or animal health. These organisms can produce various types of toxins called mycotoxins, depending on the type of fungus. Mold can also cause allergies and infections. Besides fungi can cause various levels of decomposition of food ingredients (Saputri, 2017).

Aspergillus is a fungus that is often found in various habitats, but is generally a sporphyte in soil, feed products and stored food. Aspergillus also often contaminates grains, nuts and their processed products. Aspergillus produce secondary metabolites in the form of mycotoxins among others is Aflatoxins are harmful to human health and animals as carcinogenic, mutagenic, teratogenic and immunosuppressive. The high content of aflatoxins in food or food will cause poisoning (Sukma, 2016).

Aspergillosis is a disease caused by the fungus Aspergillus. Aspergillosis is an opportunistic infection, most often occurs in the lungs. Aspergillosis disease is also called Brooder Pneumonia, mycotic pneumonia, or pneumomycosis, which is a disease that attacks the respiratory system caused by fungi (Hasanah, 2017).

Aspergillus Sp is considered a pathogen because it can cause a respiratory disease, inflammation of the granulomatosis of the mucous membranes, eyes, ears, skin, meninges, bronchi and lungs. Fungus Aspergillus sp is the cause of human infection from the pitch many of which> 90% causes the disease aspergillosis. (Getas et al., 2019).

The World Health Organization (WHO) also reported 15 developing countries with the highest number of deaths due to pneumonia with the highest number coming from India as many as 158,176, followed by Nigeria in second with 140,520 and Pakistan in third with 62,782 deaths. Indonesia is in seventh place with a total of 20,084 deaths (WHO, 2018). Based on data of Riskesdas, the prevalence of pneumonia based on the diagnosis of health workers was around 2.0% while in 2013 it was 1.6%. Bengkulu Province includes the second highest incidence of pneumonia, namely 3.4% in 2018 while 1.3% in 2013 (Dinkes Provinsi, 2018). Based on a report from the Bengkulu Provincial Health Office, the incidence of pneumonia in 2019 was 44 cases (Dinkes Provinsi, 2019).

Peanuts are a suitable substrate for the growth and development of various fungi, including the genus Aspergillus (Sukma, 2017). The results of the observation of Aspergillus fungal infection for 6 months and calculated from the first month to the third month showed the longer the storage of peanuts, the higher the Aspergillus fungal infection rate, while in the fourth to the sixth month the growth of Aspergillus fungus became significant and more than that there was a decrease in both store at cold temperatures or at room temperature (Storage, 2015).

Rujak is one of the famous food and favored by the community. Rujak uses peanuts as the basic ingredient, where the peanuts will be processed by grinding with other materials, then packaged in translucent plastic that can last longer contamination of the fungus apergilus sp to rujak sauce can be caused by producers who pay less attention to cleanliness, the influence of high humidity, and the length of storage of these ingredients. This salad gravy contains carbohydrates, fat and a high concentration of sugar, this content is very suitable for the growth of the fungus apergilus sp.

After the researchers conducted a survey in the Pantai Panjang area, it was found that on average, rujak sellers sell their rujak sauce with ground peanuts that have been ground as much as 10 kg for 2 weeks of sale and just mix it with other ingredients. Thus, regarding the length of storage of peanuts, cleanliness of packaging, and storage temperature and humidity, a study was conducted to measure the concentration of microbes in peanut-based salad dressing. The study was conducted to identify the rujak sauce in Pantai Panjang Kota Bengkulu.

METHOD

Research Design and Subject

This research uses descriptive design research. This study identified the fungus *Aspergillus sp* in Rujak sauce at Pantai Panjang, Kota Bengkulu. The population in this study were 21 traders of Rujak. The samples were taken by checked Aspergillus Sp fungus, then found 12 samples detected.

Instruments and Data Analysis Techniques

The tools used in this study were Microscope, Object glass, Deck glass, Incubator, Oven, Autoclave, Vacuum pump, Dropper pipette, Petri dish, sterile cotton sticks, Label paper, Analytical balance, Hot plate, Ose round, Erlenmeyer 500ml, Glass funnel, 50 ml measuring cup, Watch glass, Test tube, Bunsen, Match, 10 ml measuring pipette, Spatula, Scapel, Sample pot, Stir rod, Aluminum Foil and Peanut paper. The materials used in this study were 10% KOH solution, Aquadest, 70% alcohol, physiological NaCl, rujak sample and Sabouraud Dextrose Agar (SDA) Media. Hot and dry air sterilization is carried out using an oven. The tools were a 250 ml erlenmeyer, a glass funnel, a petri dish, a 100 ml measuring cup, a watch glass, a test tube, a 10 ml measuring pipette, a stirring rod and a spatula. The tool was wrapped in peanut paper and put in the oven for 1-2 hours whose temperature has reached 160 °C. Making the Media: Weighed 27, 3 grams Sabouraud agar using analytical balance put into the Erlenmeyer flask. Added 4 20 ml of distilled water and then homogenized. The solution is heated using a hotplate until it boils and forms a thick solution (gel), then put into the Autoclave for 15 minutes at a temperature of 121°C. The solution was taken from the Autoclave and then allowed to stand until a temperature of 45°C (still in a liquid state). The solution was poured into a petri dish as much as ± 20 ml in a sterile place. Let stand a few minutes until the media cools and freezes. Dilution: dilution using physiological Nacl with a ratio of 1:9 (1gr rujak soup: 9 ml physiological Nacl) and then inoculated on SDA media.

RESULTS

The results of this research as in the table below:

Table 1 Distribution of the Prevalence of *Aspergillus Sp* Fungal Infection in Rujak Sauce in Pantai Panjang, Kota Bengkulu 2021

Research result	Frequency	%
Positive	12	57.14
Negative	9	42.86
Total	21	100

Based on Table 1 shows that most of the positive salad dressing fungus *Aspergillus Sp* (57.14 %) and almost half of the negative salad dressing fungus *Aspergillus Sp* (42.86%). Then, Table 2 showed distribution of the frequency of *Aspergillus Sp* based on the *Aspergillus Sp* fungus growing from the sample of Rujak Sauce at Pantai Panjang, Kota Bengkulu 2021.

Table 2 showed distribution of the frequency of *Aspergillus Sp* based on the *Aspergillus Sp* fungus growing from the sample of Rujak Sauce at Pantai Panjang, Kota Bengkulu 2021

Samples	Information
A1	*Aspergillus Flavus*
A2	*Aspergillus Flavus*
A4	*Aspergillus Flavus*
A5	*Aspergillus Flavus*
A6	*Aspergillus Flavus*
A7	*Aspergillus Flavus*
A8	*Aspergillus Flavus*
A9	*Aspergillus Flavus*
A12	*Aspergillus Flavus*
A13	*Aspergillus Flavus*
A16	*Aspergillus Flavus*
A18	*Aspergillus Flavus*

Based on table 4.2, it can be seen that there were 12 samples of rujak sauce contaminated with the fungus *Aspergillus Sp.* The most common type of *Aspergillus Sp* fungus that contaminates salad dressing is *Aspergillus Flavus*.

DISCUSSION

The results of Aspergillus Sp fungal infection on 21 rujak sold. On the Long Beach, Kota Bengkulu, which was positive, there were 12 rujak sauces found by Aspergillus Sp. and 9 Rujak gravy which no Aspergillus Sp were found. The most common type of Aspergillus fungus found is Aspergillus Flavus. The number of positive samples showed that most of the rujak sauce in Pantai Panjang, Bengkulu City, was contaminated with the Aspergillus Sp. fungus. It showed that the lack of awareness to maintain environmental cleanliness as well as the tools and materials used when selling caused the fungus to appear in the rujak sauce, due to environmental conditions and the cleanliness of tools and materials is one of the factors causing the growth of Aspergillus Sp.

One of the tools that must be kept clean is the grinding and storage of rujak sauce. The storage time of the rujak sauce also greatly affects the growth of the fungus Aspergillus Sp flavus contamination in Rujak Sauce grows in storage of rujak sauce that does not pay attention to humidity and temperature factors (Prasetyaningsih et al., 2015). Where every rujak gravy trader is different in the treatment of making rujak gravy, starting from the cleanliness of the tools and materials used and the storage time of rujak gravy. So that most of the rujak sauce at Pantai Panjang, Kota Bengkulu is contaminated with Aspergillus Sp fungus.

Pantai Panjang environment became one of the factor, especially high temperatures, causesed the growth of Aspergillus. While other factors for the growth of Aspergillus flavus are humidity, environmental pH and chemicals (Hermawan, 2017). Meanwhile, the peanuts will be processed after the storage period, during the storage process that does not pay attention to the temperature or humidity, the peanuts will be easily contaminated by microorganisms (Nuraini, 2018). For a good peanut storage is peanuts should be stored in an enclosed place at temperatures below 18 °C, RH does not exceed 65% (Indiarto & Rezaharsamto, 2020).

The results of this study showed there was one Aspergillus species growing on the media, namely 12 Aspergllus Flavus. The results of the research that have been carried out are in line with previous research, entitled Identification of the fungus Aspergillus sp. on peanuts (Arachis hypogaea L) sold at the Kodim market which also received one species, namely Aspergillus Flavus (Amalia, 2013). Macroscopic observation of the fungus Aspergillus flavus can be seen from the growth that occurs on Sabouraud dextrose agar media. Sabouraud dextrose agar is an original or modified Emmons medium, without antibiotics which has been used as a standard medium for primary isolation (Scognamiglio, Zinchuk et., al 2010).

The morphology of Aspergillus Flavus shows that Aspergillus Flavus is a fast-growing fungus. Where in less than 1 week the Aspergillus Flavus fungus is able to grow optimally (Riaz, Rasib, Aslam, & Raza, 2018) In makroskopis fungus Aspergillus flavus has characteristics that colony granular shaped, flat, often with radial grooves, yellow at first but quickly became light-green to yellow with age . Microscopically, Aspergillus flavus has a characteristic that is, the heads of conidia usually spread, then divide to form loose columns (mostly 300-400 m in diameter), but have several heads with phialides borne directly on vesicles (uniseriate). Sti pes kasar- conidiophores hyaline and rough, often seen near the vesicle. The conidia are globose to subglobose (3-6 nm in diameter), pale green and conspicuous echinulate. Some fungi produce brownish sclerotia (Ellis, Davis et al., 2017).

Fungi cause many pathogenic infections in humans, animals and plants. This Aspergillus fungus causes several nosocomial lung infections and contributes to high morbidity (Hoda, Gupta, Shankar, Gupta, & Vijayaraghavan, 2020). There are many species of Aspergillus that can cause Aspergillosis. Aspergillus fumigatus is the most common, and other strains that infect people with low immunity are species such as Aspergillus Niger, Aspergillus, and Aspergillus Flavus (Guo et al., 2011). Aspergillus is generally found in the wild as a saprophyte, can cause abnormalities if there are predisposing factors. Predisposing factors in whom is the number of peanuts in consumption and immunity of a person. The risk of getting aspergillosis depends on overall immunity and the way we consume peanuts, if consumed continuously and in large quantities it will be very likely to be contaminated by the Aspergillus fungus (Amalia, 2013).

CONCLUSIONS AND SUGGESTIONS

Based on the results of the research and discussion can be concluded that *Aspergillus Sp.* are known to be found in rujak sauce sold in Pantai Panjang, Kota Bengkulu as many as 12 samples positive of the total sample of 21 samples, and the negative 9 samples. It is recommended for the community, especially respondents, that this research can be used as information material so that respondents can find out about the types of mushrooms in nuts and what factors can trigger the contamination of rujak sauce against mushrooms, and can better maintain environmental cleanliness.

REFERENCE

Amalia, N. (2013). *Identifikasi Jamur Aspergillus Flavus Pada Kacang Tanah (Arachis Hypogaea L) yang Dijual Di Pasar Kodim*. (1), 1–10.

Cauhan, singh and. (2013). *Influence of Environmental Factors on the Growth of Building Deteriorating Fungi: Aspergillus Flavus And Penicillium Chrysigenum*. *4*(1), 425–429.

Ellis, D., Davis, S., Alexiou, H., Handke, R., & Bartley, R. (2017). Descriptions of medical fungi. In *North*.

Guo, B., Fedorova, N. D., Chen, X., Wan, C. H., Wang, W., Nierman, W. C., Yu, J. (2011). Gene expression profiling and identification of resistance genes to Aspergillus flavus infection in peanut through EST and microarray strategies. *Toxins*, *3*(7), 737–753. https://doi.org/10.3390/toxins3070737

Hasanaht, U. (2017). *Mengenal Aspergillosis, Infeksi Jamur Genus Aspergillus*. *15*(2), 76–86.

Hermawan, M. (2017). Identifikasi Jamur aspergillus sp. *Academia*. Retrieved from https://www.academia.edu/6554036/4_identifikasi_jamur

Hoda, S., Gupta, L., Shankar, J., Gupta, A. K., & Vijayaraghavan, P. (2020). cis-9-Hexadecenal, a Natural Compound Targeting Cell Wall Organization, Critical Growth Factor, and Virulence of Aspergillus fumigatus. *ACS Omega*, *5*(17), 10077–10088.

Indiarto, R., & Rezaharsamto, B. (2020). The physical, chemical, and microbiological properties of peanuts during storage: A review. *International Journal of Scientific and Technology Research*, *9*(3), 1909–1913.

Luh, N., Gita, P., Getas, I. W., & Jannah, M. (2019). *Studi Jamur Aspergillus fumigatus penyebab Aspergillosis di Pasar Cakranegara Kota Mataram dengan Media Pertumbuhan Potato Dextrose Agar (PDA)*. *6*.

Nakes. (2018). *Hasil Utama RISKESDAS 2018 kementrian kesehatan RI Badan Penelitian dan Pengembangan Kesehatan*.

Nakes. (2019). *Data Penyakit yang Terjadi Di Kota Bengkulu Tahun 2019*.

Nuraini, S. (2018). *Identifikasi Jamur aspergillus Sp pada Samal Pecel yang Disimpan Di kulkas pada Hari Ke-7*.

Prasetyaningsih, Y., Nadifah, F., Susilowati, I., Guna, S., Yogyakarta, B., Guna, S., … Yogyakarta, B. (2015). *Komposisi gizi pada petis udang yang ada di pasaran sangat bervariasi tergantung dari bahan baku yang digunakan dan cara pembuatannya . Kandungan gizi dalam petis udang dan petis ikan menurut Direktorat Gizi (1996) yaitu : Jumlah kandungan Energi 151* ,

Riaz, A., Rasib, K., Aslam, H., & Raza, S. (2018). Molecular Identification of Aspergillus flavus Using Inter Transcribed Spacers (ITS). *Biotechnology Journal International*, *20*(4), 1–8.

Scognamiglio, T., Zinchuk, R., Gumpeni, P., & Larone, D. H. (2010). Comparison of inhibitory mold agar to sabouraud dextrose agar as a primary medium for isolation of fungi. *Journal of Clinical Microbiology*, *48*(5), 1924–1925.

Storage, D. (2015). *Contamination Aspergillus sp on Different Varieties of Peanut Seeds During Storage*. 1459–1467.

Sukma, Y. A. (2016). *Jurnal Ilmiah Mahasiswa Keguruan dan Ilmu Pendidikan Unsyiah*. (1), 1–9.

WHO. (2018). *Pneumonia Progress Report 2018.*