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COMPARISON BETWEEN DIFFERENT CULTURAL MEDIUM ON THE GROWTH OF FIVE *ASPERGILLUS* SPECIES

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ABSTRACT

The present study was aimed to Determinated the best cultural medium. In this paper, *Aspergillus* was choice to conduct this study as it is a widespread and important and conducted by many studies, and chosen five cultural media because it the most widely used in various research and cultivation of fungi used for different purposes. The growth rate of five *Aspergillus* species, grown on five different culture media were observed after 7 days of incubation at 29±1°C. The colony diameter of fungi were greatly influenced by the type of culture medium used. Five culture media were used to determinated the best media. The results of tested done on five species of *Aspergillus*, showed that the best media was SDA, PDA, Czapek, MEA and CMA respectively. Sabouraud dextrose agar (SDA), this media was use for routine cultivation and used for growing and saving the fungal isolates. Potato dextrose agar (PDA), this media was used for routine cultivation and identification of fungi. Czapek's dox agar, is used for the cultivation of fungi. Malt extract agar medium (MEA), a medium for the detection, isolation and enumeration of yeasts and moulds. Corn meal agar medium (CMA), this medium was used for differentiation between certain strains of fungi. The results will be useful for choice the best media and fungal taxonomic studies.

KEYWORD: *Aspergillus*, culture media.

INTRODUCTION

Fungi, including yeasts and filamentous species or moulds are ubiquitously distributed in nature. *Aspergillus* is a large genus of anamorphic fungi, are frequent causes of invasive fungal infections in immunocompromised patients. Fungi differ considerably in their

tolerance to different pH values and temperature. The growth of fungi may be completely inhibited in media, which are either too acidic or too alkaline. Most of the fungi, however, tend to grow better on the acidic side. Sabouraud dextrose agar can be purchased from a variety of commercial sources, either as the original recipe (Sabouraud agar, modified) or in a slightly altered version termed "Sabouraud agar, Emmons". This medium was used for culturing and maintaining the fungal isolates. Potato dextrose agar had been used for isolation of fungi.[1] Czapek's dox agar which has a defined chemical composition, is recommended for isolation of *Aspergillus*, *Penicillium*, *Paecilomyces* and some other fungi with similar physiological requirements, containing sodium nitrate as the sole source of nitrogen.[2] Malt extract agar, similar to the one described by Galloway & Burgess is recommended for the detection, isolation and enumeration of yeasts and moulds. For mycological counts it may be desirable to prepare the more acid medium in order to suppress bacterial growth.[3] Corn meal agar is recommended for chlamydospore production by Candida albicans and the maintenance of fungal stock cultures.[4]

MATERIALS AND METHODS

The study was carried out by using five cultures media which prepared as following:

Sabouraud dextrose agar

It was prepared according to the manufacturer's instructions, 65g of the culturing medium was dissolved in one litter of D.W., then 50m/ L of antibiotic (chloramphinicol) was added to the medium and sterilized in autoclaving, then poured in sterile petri dishes.[5]

Potato dextrose agar

It was prepared according to the instructions that have been mentioned by dissolving 39g of the ready medium in one liter of D.W., then determined of pH= 6.3, after preparation, the culture media was distributed into 500ml flasks and then autoclaving then poured into sterilized petri plates (20-25 ml for each plate).[6]

Czapek's dox agar

It was prepared by dissolving 45.5g of the ready medium in one liter of D.W. and sterilizated by autoclave and poured in sterilized petri plates.[7]

Malt extract agar

It was prepared by dissolving 25g of the ready medium in one liter of D.W. and sterilized by autoclave and poured in sterilized petri plates.[8]

Corn meal agar

It was prepared according to manufacturer instructions, by dissolving 17g of medium in one liter of D.W. and 10ml Tween-80, then determined pH=6.8, sterilized by autoclaving. It was cooled to 45-50ºC and then poured in sterile petri dishes.[9]

Culture of moulds

The moulds were cultured by stabbing method onto the plate and incubated at 29±1°C for 7 days to mould growth.[10]

Growth of fungi at different solid media

A disc 5mm, obtained by cork borer of fungal growth was transferred to the center of new petri dishs with different solid media includes (PDA, SDA, MEA, CMA and Czapek) incubated at 29ºC for 7-10 days and the diameter of fungal growth was measured and estimate by average of three repeated to every species.[11]

RESULTS AND DISCUSSION

Determinated the best culture media

All five culture media supported the growth of test fungi to various degrees. The results showed that the best media was SDA, PDA, Czapek, MEA and CMA respectively. The best media for *Aspergillus flavus* was SDA, PDA, Czapek, MEA and CMA respectively, while the best media for *Aspergillus niger* was SDA and PDA, then MEA and Czapek followed by CMA, while the best media for *Aspergillus fumigates* was SDA, then PDA, then MEA and Czapek, followed by CMA, while the best media for *Aspergillus terrus* was PDA, SDA, Czapek, MEA and CMA respectively and the best media for *Aspergillus nidulans* was SDA and PDA, then Czapek, then MEA, followed by CMA. All results of tested done on five species of *Aspergillus* was shown in table (1) and figure (1).

Table 1: Diameter growth rate for five *Aspergillus* species and five culture media.

Media / Fungi	SDA	PDA	MEA	Czapek	CMA
	Diameter growth rate (mm)				
A. flavus	19	17	14	12	5
A. niger	11	11	8	8	7
A. fumigatus	17	15	12	12	8
A. terrus	13	14	10	9	6
A. nidulans	11	11	9	10	5

These results were similar to another study which is observed the best media was PDA,[12]

and compatible with Diba *et. al.* [13] and Zain *et. al.* [14] whom mentioned that best media was SDA.

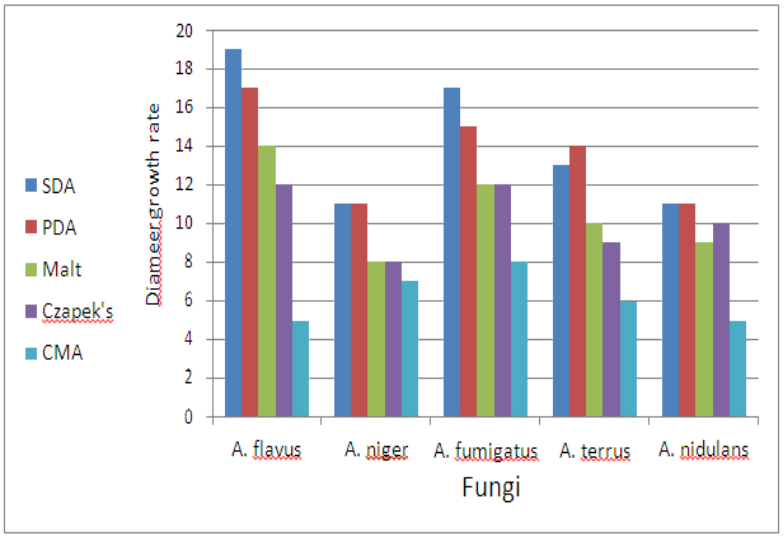

Figure 1: Different between fungi growth on culture media.

The colony diameter of selected test fungi were greatly influenced by the type of growth medium used.[15] In laboratory, these are isolated on specific culture medium for cultivation, preservation, microscopical examination and biochemical and physiological characterization. [16] Figure 2, 3 and 4 showed Aspergillus spp. growed on deferent cultural media.

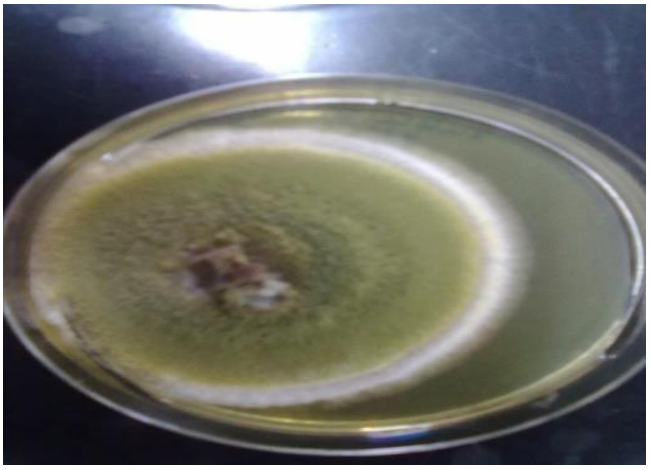

Figure 2: *Aspergillus fumigates* growth on SDA medium, incubated at 29^{0}C for 7 days.

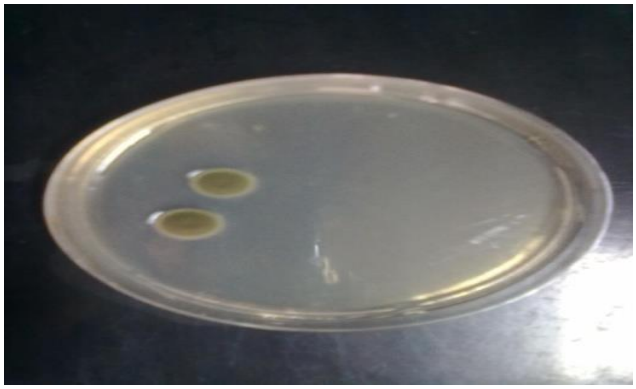

Figure 3: *Aspergillus fumigates* growth on CMA medium, incubated at 29^{0}C for 7 days.

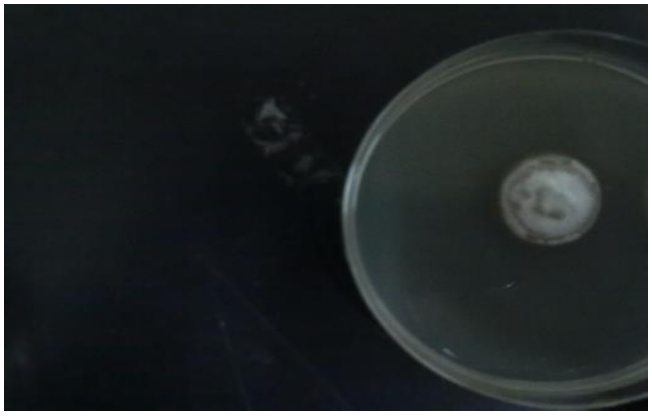

Figure 4: *Aspergillus nidulans* growth on MEA medium, incubated at 29^{0}C for 7 days.

Fungi grow on diverse habitats in nature and are cosmopolitan in distribution requiring several specific elements for growth and reproduction. [17] A wide range of media are used for isolation of different groups of fungi that influence the vegetative growth and colony morphology, pigmentation and sporulation depending upon the composition of specific culture medium, pH, temperature, light, water availability and surrounding atmospheric gas mixture.[18] Figure 5, 6 and 7 showed Aspergillus spp. growed on deferent cultural media.

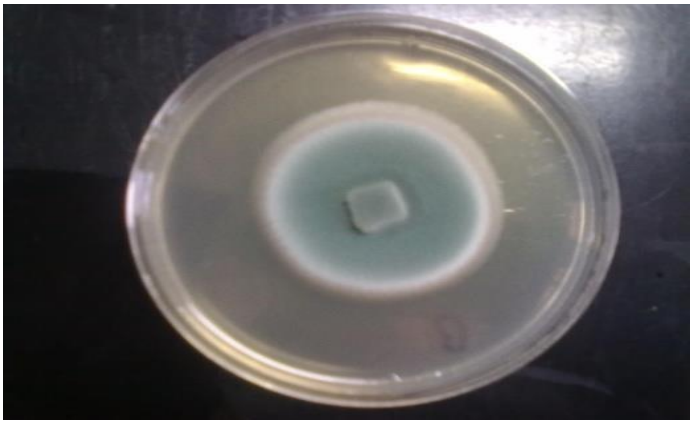

Figure 5: *Aspergillus flavus* growth on PDA medium, incubated at 29^{0}C for 7 days.

Figure 6- *Aspergillus terrus* growth on Czapek medium, incubated at 29 ^{0}C for 7 days.

Figure 7- *Aspergillus flavus* growth on Czapek medium, incubated at 29^{0}C for 7 days.

However, the requirements for fungal growth are generally less stringent than for the sporulation. Physical and chemical factors have a pronounced effect on diagnostic characters of fungi. Hence, it is often necessary to use several media while attempting to identify a fungus in culture since mycelial growth and sporulation on artificial media are important biological characteristics.[19] Physical and chemical factors have a pronounced effect on fungi. Furthermore, findings for one species are not readily extrapolated to others, particularly for filamentous fungi, where significant morphological and physiological variations exist.[20]

CONCLUSION

This study determination the best culture medium for *Aspergillus* growth was SDA then PDA.

REFERENCES

1. Lorian, V. Antibiotics in laboratory medicine. Lippincott, Williams & Wilkins, Baltimore, MD., 2005.
2. Emmons, C.W.; Binford, C.H.; Utz, J.P. and Kown-chung, K.J. Medical mycology. 3rd ed. Lea & febiger, Philadelphia., 1977.
3. Murray, P.R.; Baron, E.J.; Pfaller, M.A.; Tenover, F.C. and Yolken, R.H. Manual of clinical microbiology. 6th ed. American Society for Microbiology. Washington, D.C., 1995.
4. Mackenzie, D.W.; Loeffler, W. and Mantovani, W. Guidelines for the diagnosis, prevention and control of dermatophytoses in man and animals. World Health Organization/CDS/VPH., 1987; 1-83.
5. Kwon-Chung, K.J. and Bennett, J.E. Medical mycology. Williams and Wilkins. USA., 1992.
6. Collee, J.G.; Fraser, A.G.; Marmion, B.P. and Simmons, A. Practical Medical Microbiology. 14th ed. Churchill Livingstone., 1996.
7. McGinuis, M. R. Laboratory handbook of medical mycology. Academic press New york., 1980.
8. Narasimha, G.; Sridevi, A.; Buddolla, V.; Subhosh, C.M. and Rajsekhar, R.B. Nutrient effect on production of cellulolytic enzymes by *Aspergillus niger*. African J. Biotechnology., 2006; 5(5): 472-476.
9. Forbes, B.E.; Sahm, D.F. and Weissfeld, A.S. Bailey & scott's diagnostic microbiology. 12th ed. Mosby Elsevier Inc. Texas, USA., 2007.
10. Arther, G.J.; Ziegler, R.J.; Lukasewyez, Q.A. and Hawely, L.B. Microbiology an immunology. 3th edition. Lippincot Williams and Watkins, Philadelphia., 2004.
11. Farooq, S.; Iqbal, S.M. and Rauf, C.A. Physiological studies of *Fusarium oxysporum F*. Sp. Ciceri. Int. J. of Agri. Bio., 2005; 7(2): 275-277.
12. Sharma, G. and Pandey, R.R. Influence of culture media on growth, colony character and sporulation of fungi isolated from decaying vegetable wastes. Journal of Yeast and Fungal Research., 2010; 1(8): 157-164.
13. Diba, K.; Kordbacheh, P.; Mirhendi, S.H.; Rezaie, S. and Mahmoudi, M. Identification of Aspergillus species using morphological characteristics. Pak. J. Med. Sci., 2007; 23(6): 867-872.
14. Zain, Z.M.; Ihsak, R. and Ghani, E.K. The Influence of Corporate Culture on Organisational Commitment: A Study on a Malaysian Listed Company. European Journal

of Economics, Finance and Administrative Sciences., 2009; 17: 17-25.

15. Mehta, J.; Jakhetia, M.; Choudhary, S.; Mirza, J.; Sharma, D.; Khatri, P.; Gupta, P. and Nair, M.M. Impact of carbon & nitrogen sources on the *Trichoderma viride* (Biofungicide) and *Beauveria bassiana* (entomopathogenic fungi). European Journal of Experimental Biology., 2012; 2(6): 2061-2067.
16. Reich, M.; Bosshard, P.P.; Stark, M.; Beyser, K. and Borgmann, S. Species identification of bacteria and fungi from solid and liquid culture media by MALDI- TOF mass spectrometry. Journal Bacteriol. Parasitol., 2013; 5(2): 1-8.
17. Kuhn, D.M., and Ghannoum, M.A. Indoor mold, toxigenic fungi and Stachybotrys chartarum: Infectious disease perspective. Clin Microbiol Rev., 2003; 16: 144- 172.
18. Kumar, K.J.; Reddy, C.H.K. Gunashakaran, V.; Ramesh, Y.; Babu, P.K.; Narasimha, N.P.; Venkatewarulu, A. and Reddy, P.L. Application of broad spectrum antiseptic povidone iodine as powerful action: a review. Journal of Pharmaceutical Science and Technology., 2009; 1(2): 48-58.
19. St-Germain, G. and Summerbell, R. Identifying filamentous Fungi- A Clinical Laboratory Handbook. 1st ed. Star Publishing Company, Belmont, California., 1996.
20. Meletiadis, J.; Meis, J.F.G.M.; Mouton, J.W. and Verweij, P.E. 2001. Analysis of growth characteristics of filamentous fungi in different nutrient media. J. Clinical Microbil., 2001; 3(2): 478-484.