ISSN: 0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 5, Issue, 12, pp. 2283-2285, December, 2014

International Journal of Recent Scientific Research

RESEARCH ARTICLE
ROLE OF BROTH MEDIA ON GROWTH OF *ASPERGILLUS NIGER*

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ARTICLE INFO

Article History:

Received 11th, November, 2014
Received in revised form 18th, November, 2014
Accepted 14th, December, 2014
Published online 28th, December, 2014

Key words:

Aspergillus niger, Cowpea, Richards's broth, Sabouraud Dextrose broth, Potato Dextrose broth, Yeast Extract broth, Asthana Hawker's broth.

ABSTRACT

Aspergillus niger was isolated from the seed of *Vigna unguiculata* var.*sesquipedalis*(L) Verdcourt. Biomass production of isolate were quantitatively determined in five different broth media. The selected broth media were Asthana Hawker's, Potato Dextrose, Richards's, Sabouraud Dextrose and Yeast Extract. *Aspergillus niger* produced more biomass in Richards's broth followed by Sabouraud Dextrose broth, Potato Dextrose broth, Yeast Extract broth and Asthana Hawker's broth.

INTRODUCTION

Fungi grow on diverse habitats in nature and are cosmopolitan in distribution requiring several specific elements for growth and reproduction. Fungi are heterotrophic organisms, they require external sources of organic compounds for food. A nutrient material prepared for the growth of microorganisms in a laboratory is called culture media and the nutrient composition of a culture medium plays a major role in microbial growth (Tortora and Funk, 1995). A wide range of media are used for cultivation of different groups of fungi that influence the vegetative growth and colony morphology, pigmentation, sporulation depending upon the composition of specific culture medium (Northolt and Bullerman,1982). Many fungi are used as source of food and in fermentation of various food products. More recently, fungi are being used as sources of antibiotics and various enzymes such as cellulases, pectinases. Many fungi produce bioactive compounds, mycotoxins that are toxic to animals including humans. Several species of fungi are significant pathogens of humans and other animals. Losses due to funal diseases of crops and food spoilage caused by fungi can have a large impact on human food supply and local economics (Ikechi-Nwogu and Elenwo, 2012). In this context the present study was undertaken to measure the growth of *Aspergillus niger* in different culture media.

MATERIALS AND METHODS

Source of organism

Lola variety of Cowpea (*Vigna unguiculata* var. *sesquipedalis* (L) Verdcourt) was selected for the isolation of seed borne pathogen *Aspergillus niger*.

Isolation of *Aspergillus niger*

Seeds were surface sterilized with 0.01% aqueous Mercuric chloride solution and thoroughly washed thrice with sterile distilled water and then transferred to culture tubes containing Water-Agar medium under aseptic condition (Neergaard, 1977). It is kept for seven days of incubation at 30^0C. After seven days of incubation the inoculated tubes were tested for the presence of internal seed borne pathogen. Then the pure culture of isolate was prepared and it was identified by the reference of Gilman (1945). The isolate were maintained in PDA slants for further study.

Determination of biomass production

The isolates maintained on PDA medium were cut into small pieces with the help of sterile cork borer of 1cm width. These pellets of isolates were cultured in different broth media and kept for 7 days incubation at 30^0C. The P^H of the medium was maintained at 4.5.

After 7 days of incubation the mycelial mats were collected on a pre – weighed Whatman No. 1 filter paper, washed thrice with distilled water and oven dried at 70^oC for 24hrs and reweighed. The mycelial weights were calculated by subtracting the final and initial weights **(**Nair, 1995). The compositions of five different broth media are given below.

Asthana and Hawker's medium (Tuite, 1969)

Glucose	– 5g
Potassium nitrate	– 3.5g
Potassium dihydrogen phosphate	– 1.75g
Magnesium sulphate	– 75mg
Distilled water	– 1000ml
P^H	– 4.5

Potato Dextrose Broth

Potato	– 200g
Dextrose	– 20g

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Distilled water	– 1000ml
P^H	–4.5

Richards's Broth (Ainsworth, 1971)

Sucrose	– 50g
Potassium dihydrogen phosphate	– 5g
Potassium nitrate	– 10g
Magnesium sulphate	– 2.50g
Distilled water	– 1000ml
P^H	– 4.5

Sabouraud Dextrose Broth

Dextrose	– 40g
Peptone	– 10g
Distilled water	– 1000ml
P^H	– 4.5

Yeast Extract Broth

Peptone	– 5g
Beef extract	– 3g
Sodium chloride	– 5g
Yeast extract	– 5g
Distilled water	– 1000ml
P^H	–4.5

RESULTS AND DISCUSSION

Aspergillus niger was isolated from the seeds of Lola variety of Cowpea (*Vigna unguiculata* var. *sesquipedalis* (L) Verdcourt). *Aspergillus niger* colony appeared to be brown – black in colour on PDA medium and they are colourless on the reverse side. The hyphae are well developed, profusely branched, septate, and hyaline, multinucleate. The mycelium produces an abundance of conidiophores and they arise singly from the somatic hyphal cell called foot cell. Conidiophores are long erect hyphae, each terminating in a bulbous head, the vesicle on which bottle – shaped sterigmata arise all over the surface and produce chains of conidia at the tips. The conidia are typically globose. The colour of the conidiophores and the conidia impart brown – black colour to the colony. Vesicle is globose and are 43.5µm in diameter and the primary sterigmata reach up to 60X8µm. Secondary sterigmata are short and are 10X3.5µm. B. Fawole *et al*., (2006) isolated *Aspergillus niger* from Cowpea seeds. Raj *et al*., (2007) also recorded *Aspergillus* spp., *Cercospora* spp., *Penicillium* spp. from farmers' saved Cowpea seed. The isolate was grown in five different broth media for testing their effect on biomass. Makun *et al*., (2012) were identified the fungi genera contaminating the Cowpea seeds in order of decreasing prevalence were *Aspergillus, Fusarium, Mucor, Penicillium* and *Rhizopus* spp.

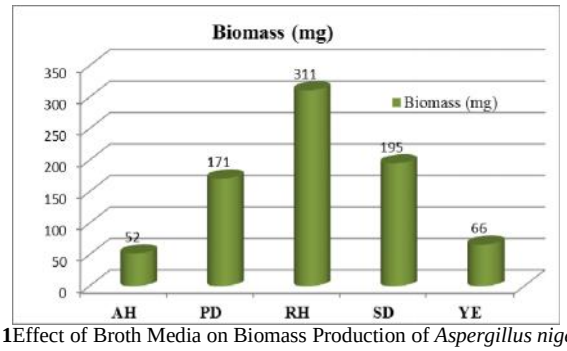

Fig 1 Effect of Broth Media on Biomass Production of *Aspergillus niger*

The isolates were grown in five different broth media at 30^0C and $P^{H\ 4.5}$ for 7 days of incubation Maximum growth of *Aspergillus niger* was found in Richards's broth (311mg) followed by Sabouraud Dextrose broth (195mg), Potato Dextrose broth (171mg), Yeast Extract broth (66mg) and Asthana Hawker's broth (52mg).

From the results obtained, Richards's broth (311mg) performed better than other media. The difference in the performance is probably due to the fact that it contains sucrose and minerals that have been identified as vital to fungal growth. The second best medium was Sabouraud Dextrose (195mg) broth followed by Potato Dextrosebroth (171mg). Organisms in this broth grew well probably due to its nutritional content.

Ikechi-Nwogu and Elenwo (2012) reported *Aspergillus niger* showed medium growth in Potato Dextrose broth. Gautam *et al*., (2011) reported the better growth of *Apergillus niger* in Richards's broth and Potato dextrose broth. Previous work reported that Potato Dextrose broth was suitable for growth of fungi. According to Amrita and Richa (2014) *Aspergillus niger* showed growth in Richards's broth followed by Potato Dextrose Broth and Yeast Extract Broth.

In conclusion, evaluating the suitability of these growth media, Richards's broth media was the best medium followed by Sabouraud Dextrose broth ,Potato Dextrose broth, Yeast Extract broth and Asthana Hawker's broth medium.

Acknowledgement

We express our sincere thanks to Dr. Mary Chacko, Head of the Department of Botany, Mar Thoma College, Thiruvalla for giving me an opportunity and providing necessary laboratory facilities. I wish to express my profound gratitude to Dr. Sajeena, Scientist of Kerala Agricultural University Research Centre, Kallunkal, Thiruvalla for providing seed samples for this work.

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