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The Effect of Honey on the Mycelial Growth of *Pleurotus sajor caju* (Oyster mushroom)

Stanley H.O, Odu N.N. and Onwuka J.U.
Department of microbiology, university of Port Harcourt, P.M.B 5323 Choba, Port Harcourt, Rivers State, NIGERIA

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Abstract

Various agar culture containing different quantities of honey were investigated for culturing the mycelial of Pleurotus sajor-caju, an edible mushroom. The mushroom was cultured to source for low input, cheap and an improved method of growing active mycelial for the production of viable mushroom spawn (seeds). The study revealed that P. sajor-caju had the highest mycelial growth with growth rate 12.14mm/day on 25ml of honey on cassava peeling culture media while the least mycelial was observed on plantain peeling culture media with growth rate of 2.43mm/day on 25ml of honey. From the study it is clear that organic waste materials could be incorporated in culture media preparation for edible mushroom mycelial production.

Keywords: culture media, mycelial growth, honey, effect, Pleurotus sajor-caju.

Introduction

Some intricate scientific steps taken to culture edible mushrooms has prevented interested persons into the business of mushroom production. The methods adopted in this study will assist farmers cultivate mushrooms. It is an economic based research mainly for rural farmer. Also production of active mycelium, which this study deals with, is one of the most critical stages of mushroom cultivation which has prevented a lot of interested and would be mushroom farmers from getting involved. Once people are sure of source and availability of mushroom seeds (Spawn) much more interest will be developed. It might even become a hobby beside income generation. In Europe, North America, Japan, China, South East Asia and Australia where adequate technology are available mushrooms are cultivated for export trade and local consumption. Ugandan mushroom growers for instance are currently selling 44 tones per year to Japan, 40 tones to U.S.A. and 2 tones to the Democratic Republic of Congo[1]. Today China is the major producer of mushroom in the world[2]. Mycelial production has been described as the bedrock of mushroom industry and limiting factor to mushroom cultivation or production all over the world[3].

Culturing began in France about 1894. An early study carried out by two scientists in 1902 and 1905 respectively gave birth to the method of preparation of pure culture through tissue culture or spore culture[4,5]. Jenison[6] and Kaul[7] reported that when meals of grains, legumes, orange, banana, cetery, alfalfa, parsnip, corn steep and gluten extracts are incorporated in agar mycelial growth are accelerated. Excellent growth of mycelia due to incorporation of malt and yeast extracts in agar was observed with Coprinuslimetarius[8]. Agaricus blazei[9], Fomes lignosus[10] and Aurcularia Spp[11,12] ascribed the beneficial effect of these extracts on mycelial growth to the thiamine, amino acids and nutrient contents of the extracts.

Kadiri M. and I.A. Kehinde[13] in their study investigated the effect of glutamic and aspartic acids and their corresponding Keto acids and half amides on mycelial growth of Tricholoma species. They found that all the compounds used in their study, accelerated mycelial growth. According to Chang S.T and Hayes W.A.[14] the active mycelia which is used to produce mushroom seeds (spawn) depends on agar medium for food substances necessary for its growth and ramification. Jabloski L.[15], Ingold C.T. and Hudson H.J.[16] and Poppe J.[17] reported that good culture media can influence mushroom growth and this also depends on available nutrients. pH, microbial activities, aeration, water content or free water activity. Edward R.[18] also reported that the more easily accessible nutrients are, the more dense the mycelia ramification. The study was to determine the effect of honey on the mycelial growth of *Pleurotus sajor caju.*

Materials and Methods

The study was carried out in the department of microbiology, faculty of science, university of Port Harcourt

Source of Materials: Viable mycelial culture of Oyster mushroom (*Pleurotus sajor caju)* was obtained from National Biotechnology Development Agency (NABDA) Odi, Bayelsa State and honey from Kabari in Kogi State.

Potato Dextrose Agar (PDA) was obtained from a scientific shop in Port Harcourt whereas the organic wastes. (cassava peels, Yam peels water melon pod, plantain peels and spent oil

palm bunch were gotten from Alakahia, in Obio-Akpor Local Government Area of Rivers State

Media Preparation: Six different solid media were used. The media used were potato Dextrose Agar (ready to use) and the others were formulated. These include; spent oil palm bunch extract media, cassava peel extract media, yam peel extract media, plantain peels extract media and water melon pod extract media

Potato Dextrose Agar (PDA): PDA was prepared by adding 3.9g of potato Dextrose Agar powder to 100ml, consisting of distilled water and honey of 0ml, 5ml, 10ml, 15ml, 20ml and 25ml in six different conical flasks respectively. The mixture was allowed to dissolve and then autoclaved at 121^{o}C for 15 minutes. After cooling to about 45^{o}C, it was then dispensed into Petri dishes in duplicates.

Spent oil palm bunch extract media: This was prepared by adding 150g of oil palm bunch waste to 1 liter of distilled water which was boiled for 30 minutes it was allowed to cool to room temperature, filtered with a piece of muslin cloth and the supernatant retrieved. The supernatant of 100ml, 95ml, 90ml, 85ml, 80ml, and 75ml were dispensed into six different conical flasks and various volumes of honey are added to each of the conical flask at the rate of 0ml, 5ml, 10ml, 15ml, 20ml and 25ml respectively. 2g of pure agar were also added to reach of the flask, dissolved and autoclaved at 121^{o}C for 15minutes. After cooling to about 45^{o}C, media, were dispensed into Petri dishes in duplicates.

The same process was used in obtaining cassava peels, yam peels, plantain peels and water melon pod extract media. Two perpendicular diameters were drawn on the bottom of the Petri-dishes containing various culture media used for the study, so that they intercept at the centre of the plates. In each case, the inoculum was placed at the centre of the medium (i.e. loopful of actively growing mycelia per plate). The plates were incubated at 30^{o}C and observed for seven days, during which the mycelial vegetative growths of Pleurotus sajor caju were recorded.
The growth rate was measured with the formula below;

Growth rate = Colony diameter in the last day of incubation (mm)
Number of days measurement was taken after inoculation

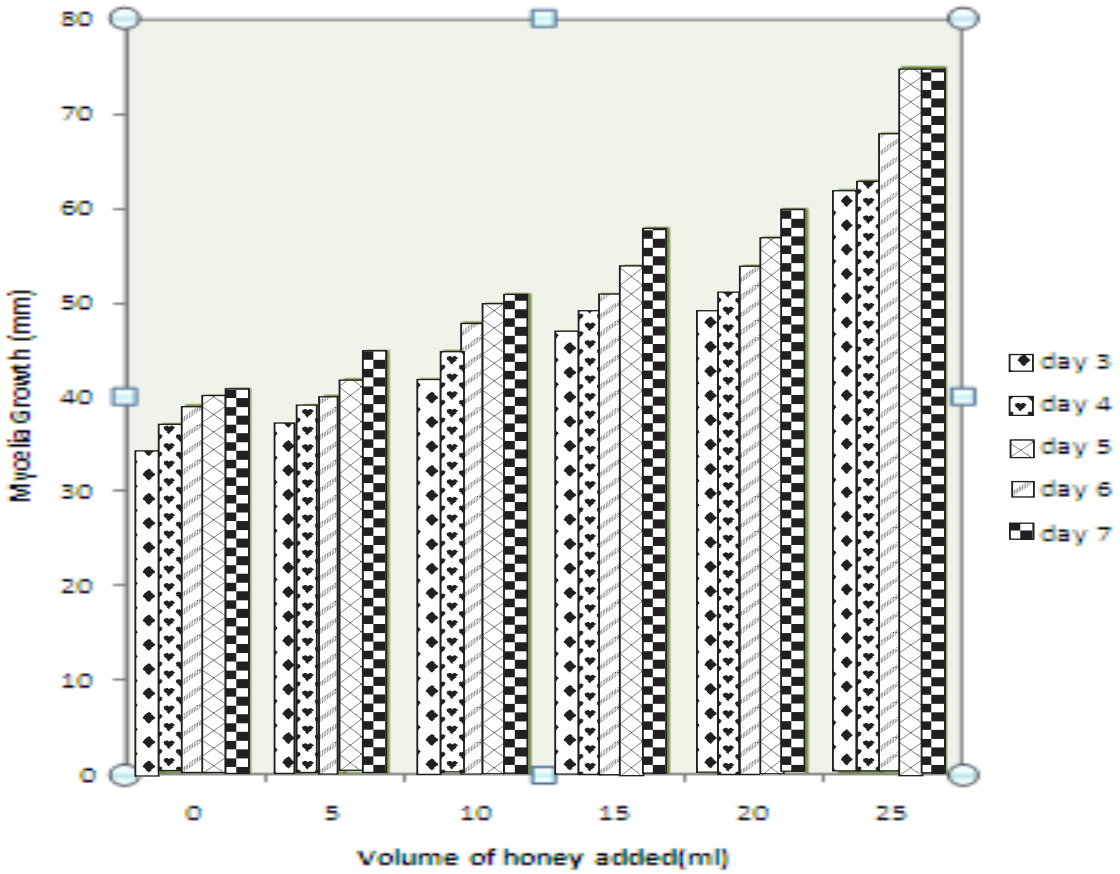

Figure-1
Mycelia growth of *Pleurotus sajor caju* oil palm bunch culture media

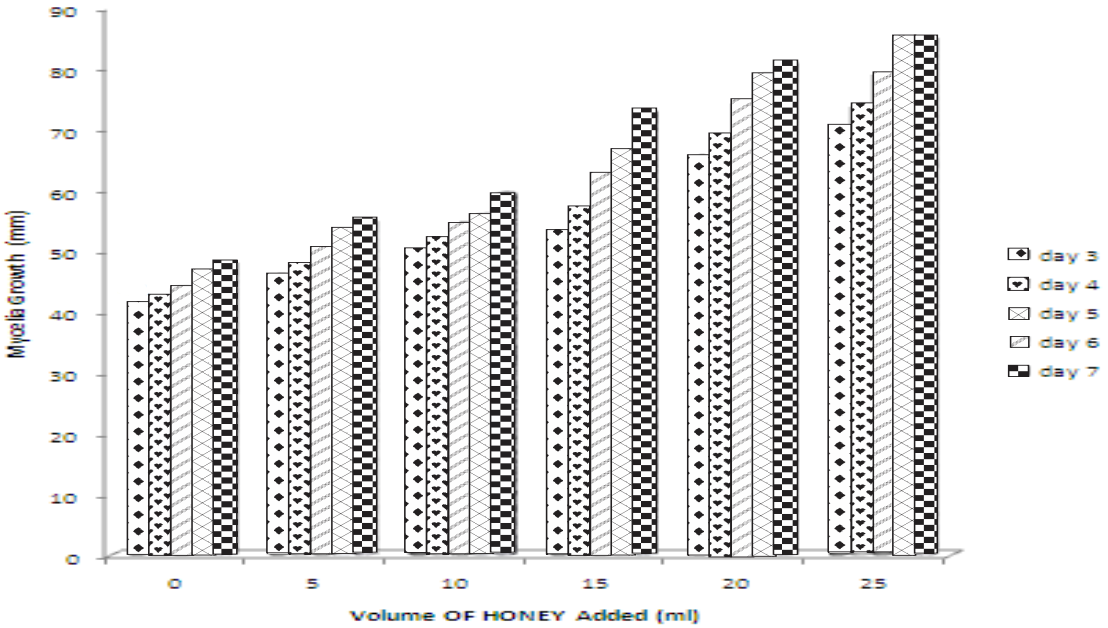

Figure-2
Mycelia growth of P. sajorcajuon yam peelings culture media

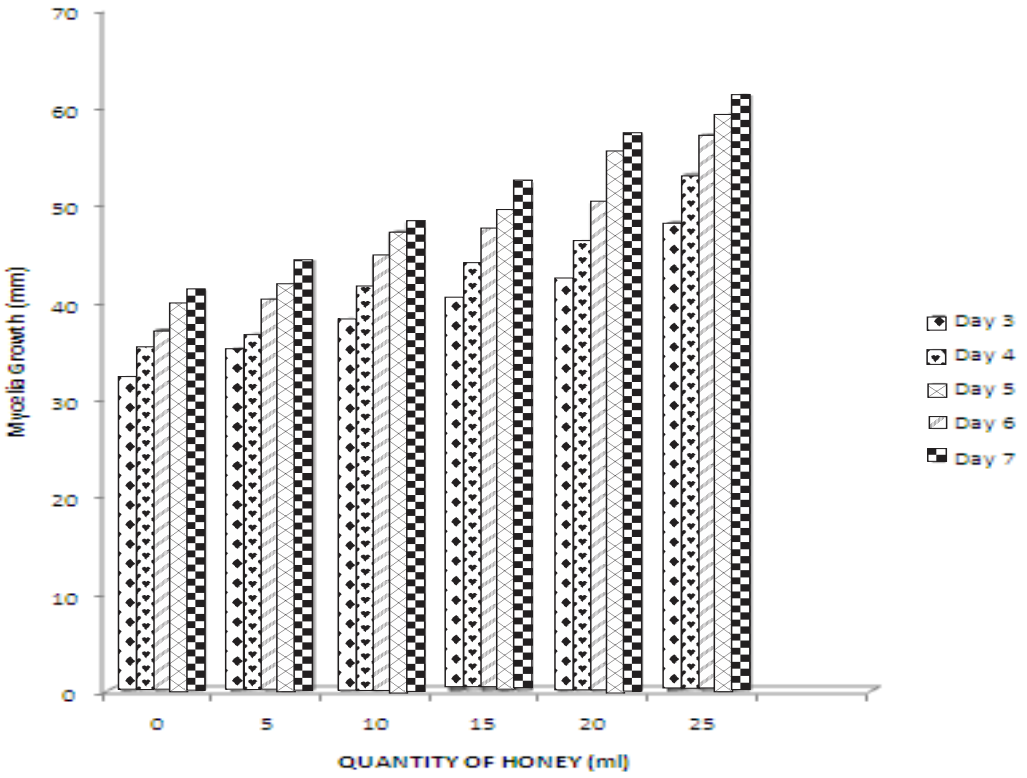

Figure-3
Mycelia growth *P. sajor caju* on cassava peelings culture media

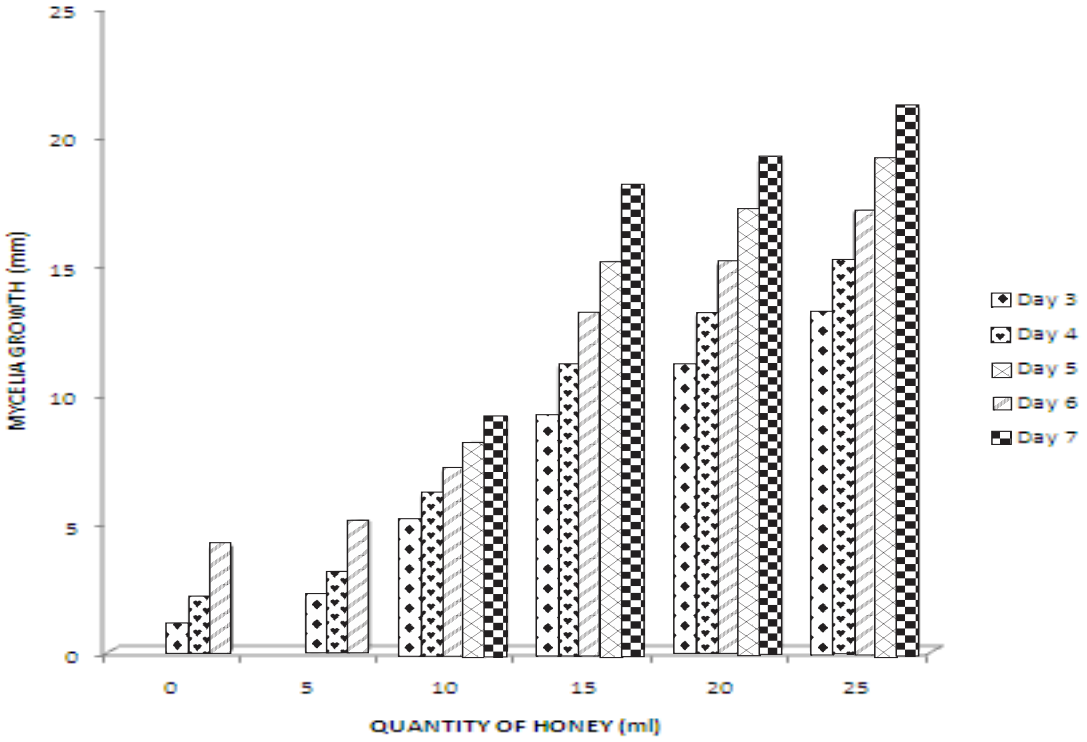

Figure-4
Mycelia growth of P. sajor caju on water melon pod culture media

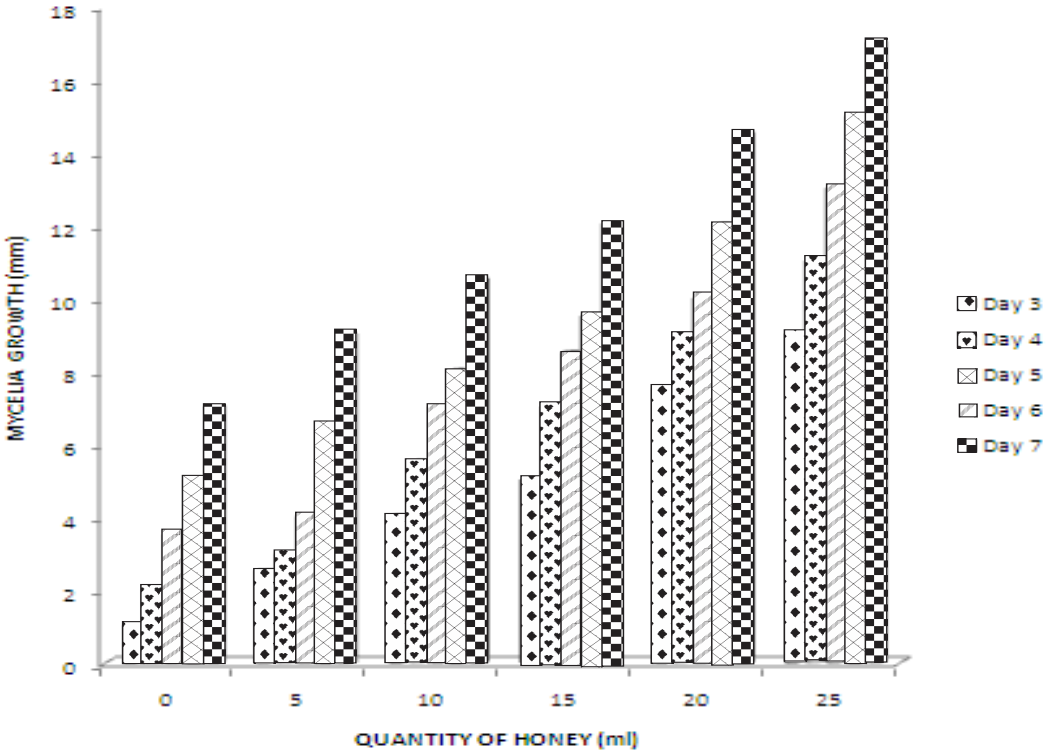

Figure-5
Mycelia growth of P. sajor caju on plantain peelings culture media

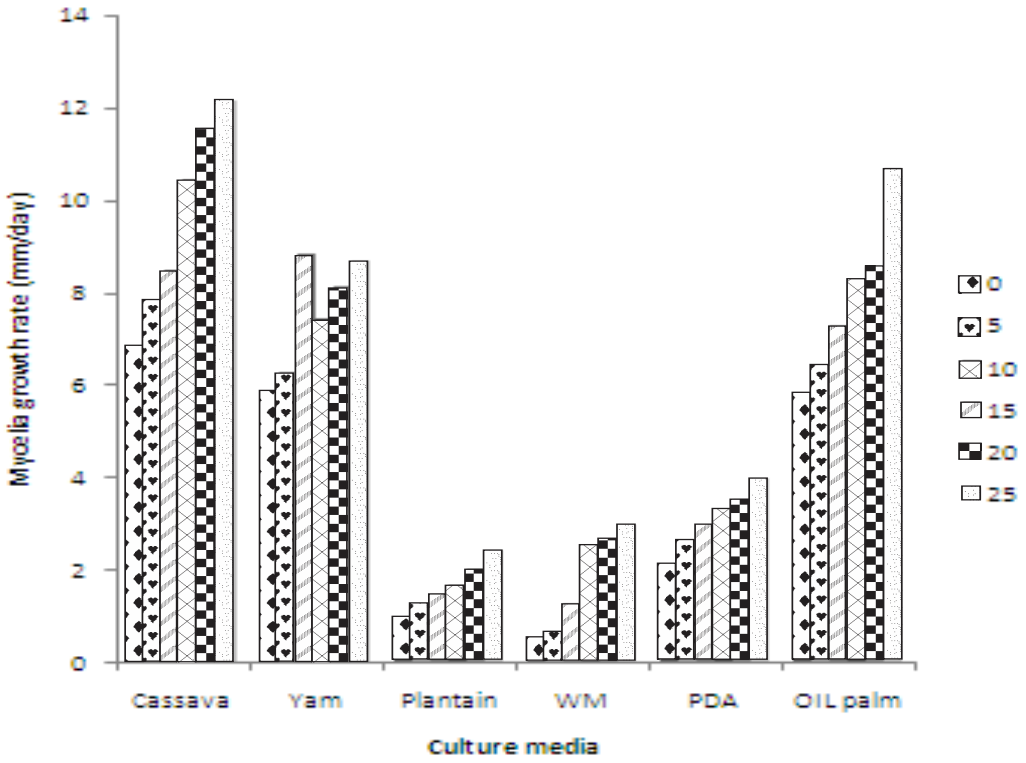

Figure-6

Mycelia growth rate of *P. sajor-caju* on various culture media with different quantities of honey

Results and Discussion

Results: Cassava: cassava peelings culture media. Oil palm: oil palm bunch culture media. Yam: yam peelings culture media. WP: water melon pod culture media. Plantain: plantain peelings culture media. PDA: potato dextrose agar culture media.

Discussion: All the supernatant culture media stimulated higher mycelia growth than synthetic agar culture media (potato dextrose agar) except for plantain peelings and water melon pod culture media employed in this study. The result on culture media indicates that *P. sajor caju* can grow very well on cassava peelings, oil palm bunch waste and yam peelings culture media respectively. These results compares favourably with the findings of Ukoima H.N. and Ikpe F.N.[19]. The stimulatory substances suspected to be present in the culture media were amino acids, vitamins and essential nutrients, which combined to influence the growth of mycelia on these culture media. This view is also supported by Kadiri M and I.A Kehinde[13] who investigated the effect of amino acids and aspartic acids and corresponding keto acids on mycelia growth of *Trichoma* species found all the compounds to accelerate mycelia growth.

Addition of honey to the various culture media increased the mycelia growth. The reason for this might be that mycelia growth is enhanced by the composition of honey which includes glucose, fructose, amino acids and vitamins e.t.c.

The purpose of culturing mushroom mycelia is to boost it to a state of vigour such that it will rapidly colonize the selected organic matrix for spawn (mushroom seeds) production.

Conclusion

Mushroom farming is not just a rapidly expanding agribusiness; it is also a significant tool for the restoration, replenishment and remediation of the earths overburden ecosphere. The rapid development and growth of the mushroom industry from a punitive cave culture into one using technical and controlled methods ensures that interested farmers and those who are growers may not need to worry about spawn (mushroom seeds) source.

From this study, cassava peelings, oil palm bunch waste and yam peelings are suitable media for culturing *P. sajor caju* respectively. They stimulated luxuriant mycelia growth better than other media employed in this study. It is however recommended that the use of farm waste supernatant extracts as culture media be encouraged in culturing and boosting the vigour of mushroom mycelia for spawn (seed) production. It was also observed in this study that honey as supplements stimulated mycelia growth. Finally the observed patterns on mycelial growth are due to the contents of the culture media, clean environment and procedure adopted.

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