VEGETATIVE GROWTH OF DIFFERENT STRAINS OF PLEUROTUS AND LENTINULA SPECIES ON CASSAVA (*Manihot esculenta*) AND YAM (*Dioscorea rotundata*) WASTES IN GHANA.

Matilda D. Dzomeku

Outline

- Introduction
- Objective
- Methodology
- Results
- Conclusion
- Recommendation
- Acknowledgement

Introduction

- Mushrooms are fast becoming important components of diets worldwide

- They are a good source of protein, vitamins and minerals and contain about 85-95% water, 3% Protein, 4% Carbohydrates, 0.1% fats, 1% minerals and vitamins on fresh weight basis

- Mushrooms contain appreciable amounts of potassium, phosphorus, copper and iron but have low levels of calcium. Mushroom protein is intermediate between that of animals and vegetables

- Various substrates are used to grow them. There is however the need to continue in the search for other appropriate substrates on which they can be grown

Intro cont’d

- Cassava (*Manihot esculenta* Crantz) is the third most important source of calories in the tropics, after rice and maize
- Eight hundred million people depend on cassava in Africa, Asia and Latin America
- In many places where cassava is cultivated and processed, heaps of cassava peels are discarded along the roads and causes unpleasant odours and unhygienic conditions

Intro cont'd

- Over 90 per cent of the peels are either burnt or left unattended to at dumping sites

- A total of 3.6 million tonnes of cassava waste peels are discharged during the peeling process which are generated annually

- Peels represents around two thirds of the waste, about 200,000 tonnes of cassava can be saved through more efficient peeling which translates into potential savings of almost $37 million

Intro cont'd

- In the case of yams (*Dioscorea rotundata*) , waste is mostly generated at the consumption level through households, chop bars and food vendors
- Yam processing is very limited, it is done by a few small and medium enterprises
- Yam peels constitute about 14 per cent of the volume of yam consumed and approximately five per cent of volumes of the crop tend to go waste
- The use of cassava and yam peels can therefore be used as efficient substrate for mushroom cultivation

Objective

The objective of this study is to evaluate the use of cassava and yam wastes as suitable substrates for the vegetative growth of five strains of *Pleurotus* spp. and three strains of *Lentinula* mushrooms within Ghanaian environmental conditions

Methodology

- The cultures used for this work were obtained from the Plant Research International of the University of Wageningen, The Netherlands

- Cassava Peels Agar -CPA, Cassava Sticks Agar-CSA, Yam Peels Agar-YPA and Sawdust Agar-SDA were prepared

- The vegetative growth of mycelium of the mushroom on the different media were assessed

RESULTS

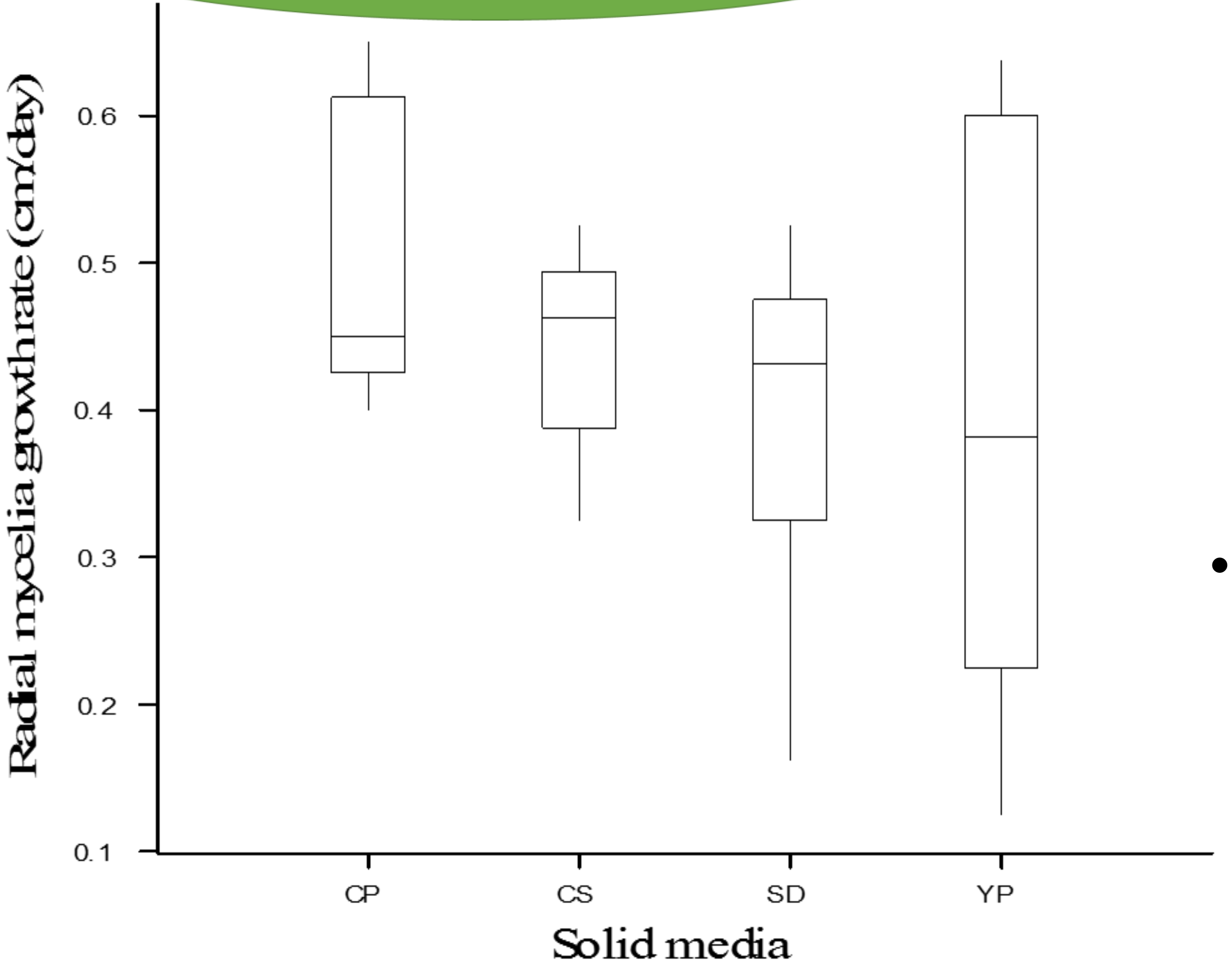

Figure 1: Box-and-whisker plots showing mycelia growth rate on the solid media

- Across the strains, the slowest and fastest growth rates was recorded on CPA at 0.4 and 0.7 cm/day respectively, with a mean value of 0.45 cm/day (Fig. 1). Growth rates recorded for the strains on YPA showed wide variations, with values falling within the extreme ranges of 0.1-0.7 cm/day with a mean value of 0.38 cm/day (Fig. 1)

- Mean mycelia growth rates of 0.46 and 0.44 cm/day were recorded on CSA and SDA respectively (Fig. 1)

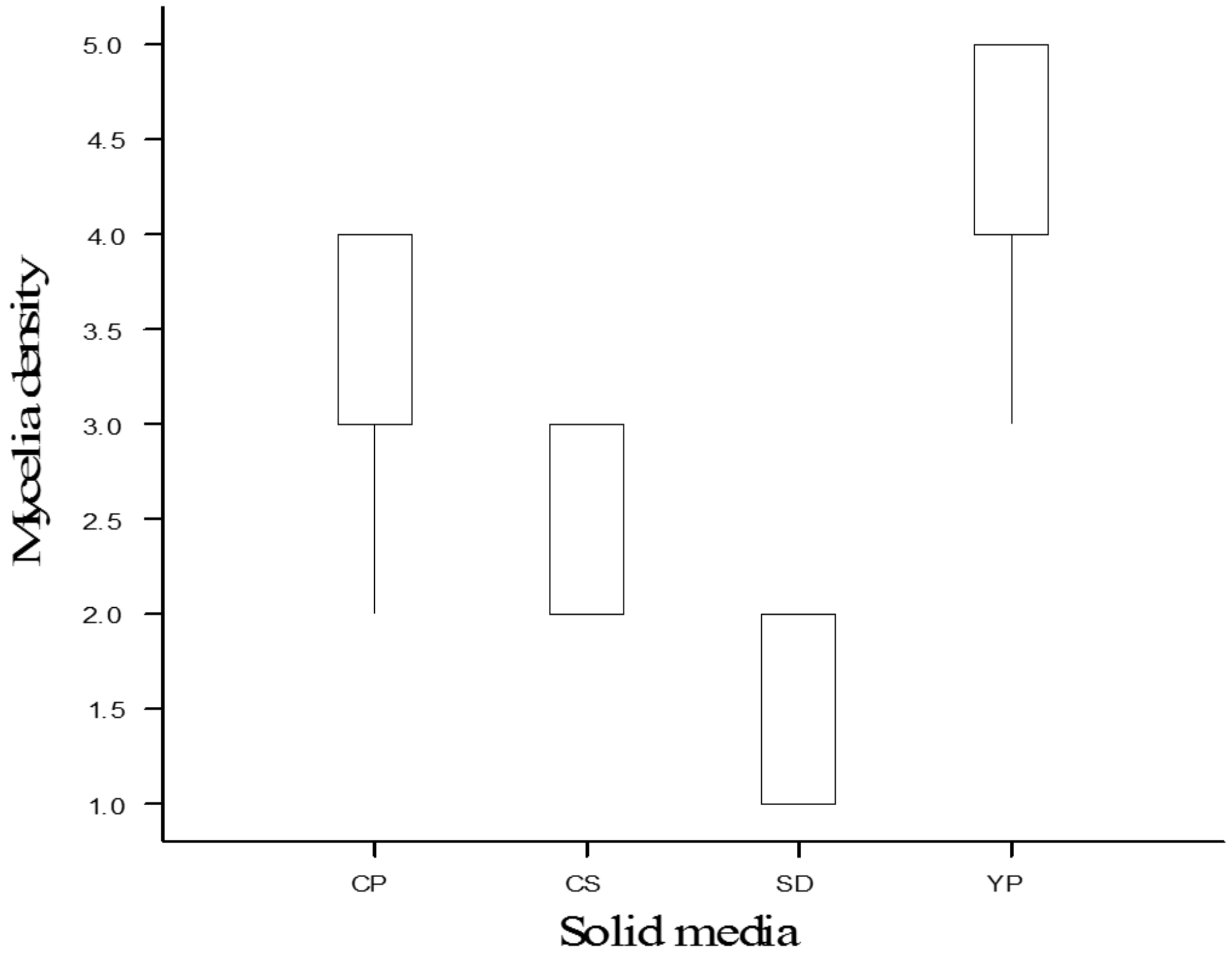

Figure 2: Box-and-whisker plots of MES strain mycelia density on the solid media

- Mycelia densities recorded across the mushroom species and strains on CPA had various degrees of mycelia density (ranged from 2-4), those for CSA were quite dense (2 and 3), and YPA were generally highly dense (ranged from 3-5) (Fig. 2). The lowest mycelia densities (1 and 2) were observed on SDA (Fig. 2)

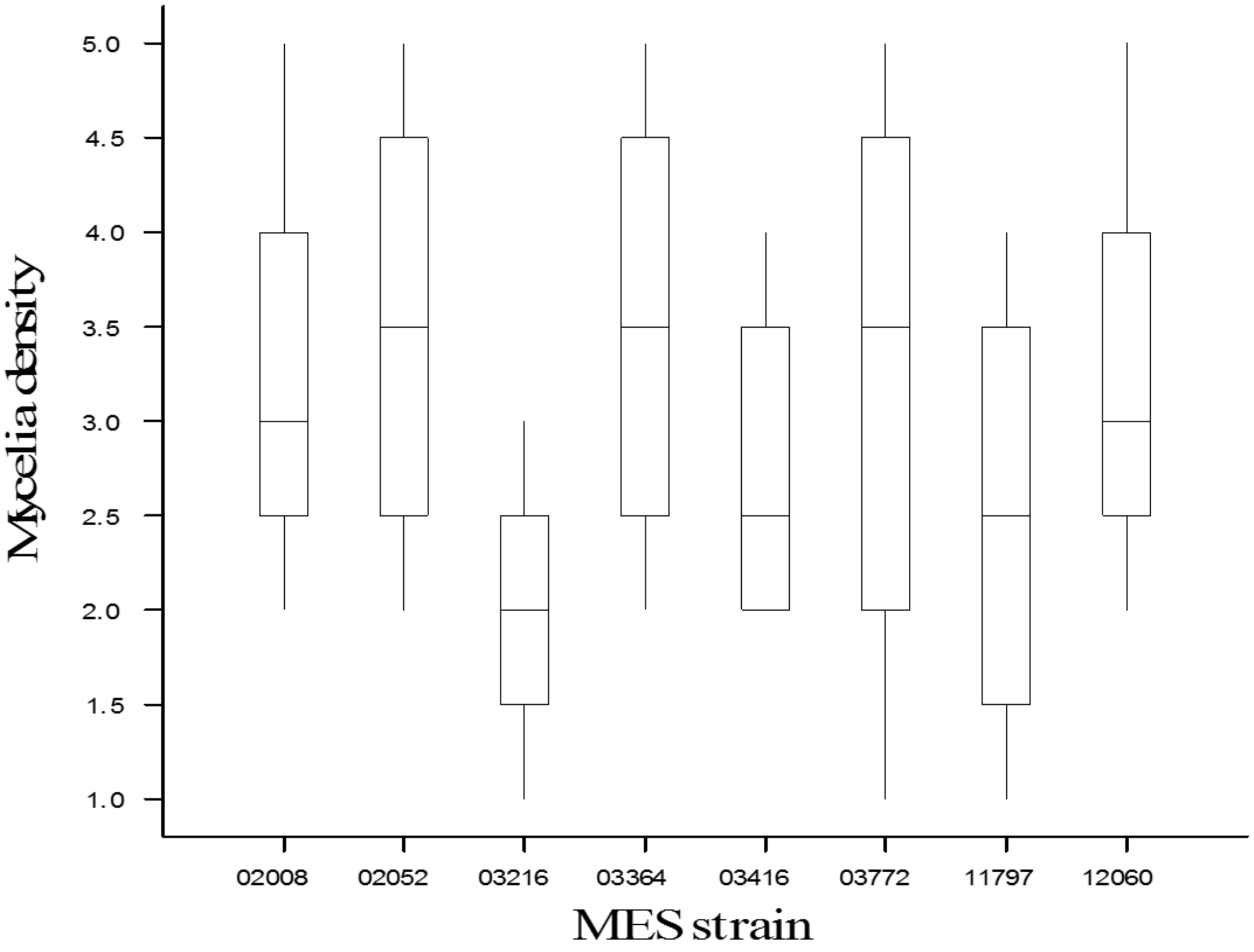

Figure 3: MES strain mycelia density on solid media

- In Fig 3 the strains showed comparable mycelia densities on the various media, although strain MES 03216 showed relatively low mycelia densities across the media. Mycelia densities of MES 03772 differed when incubated on the different solid media.

- A weak negative correlation of -0.0635 was obtained between values recorded for mycelia growth rate and mycelia density for all the mushroom strains studied on the various solid media.

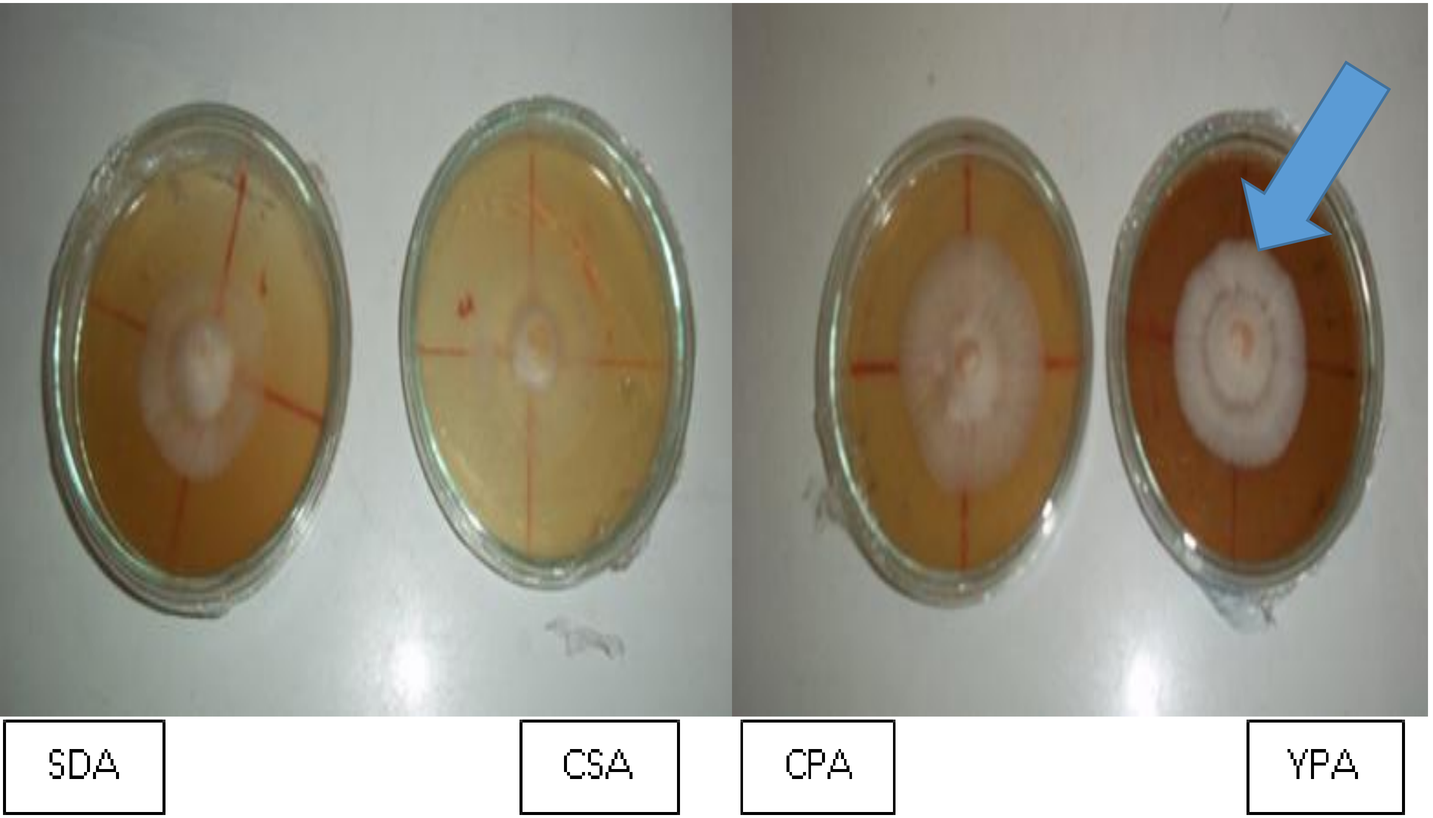

Figure 4a. Morphology of mycelial growth of P. ostreatus MES 11797 on the various solid media on the second day of incubation

- The various strains had different morphological characteristics during growth on the different media. MES 11797 strain showed clear zonation at the edge of the mycelium (Fig. 4a). In addition, longitudinal radial mycelia was observed on both sawdust and cassava sticks agar. Concentric longitudinally radial growth on YPA was quite prominent but not as prominent as on CPA.

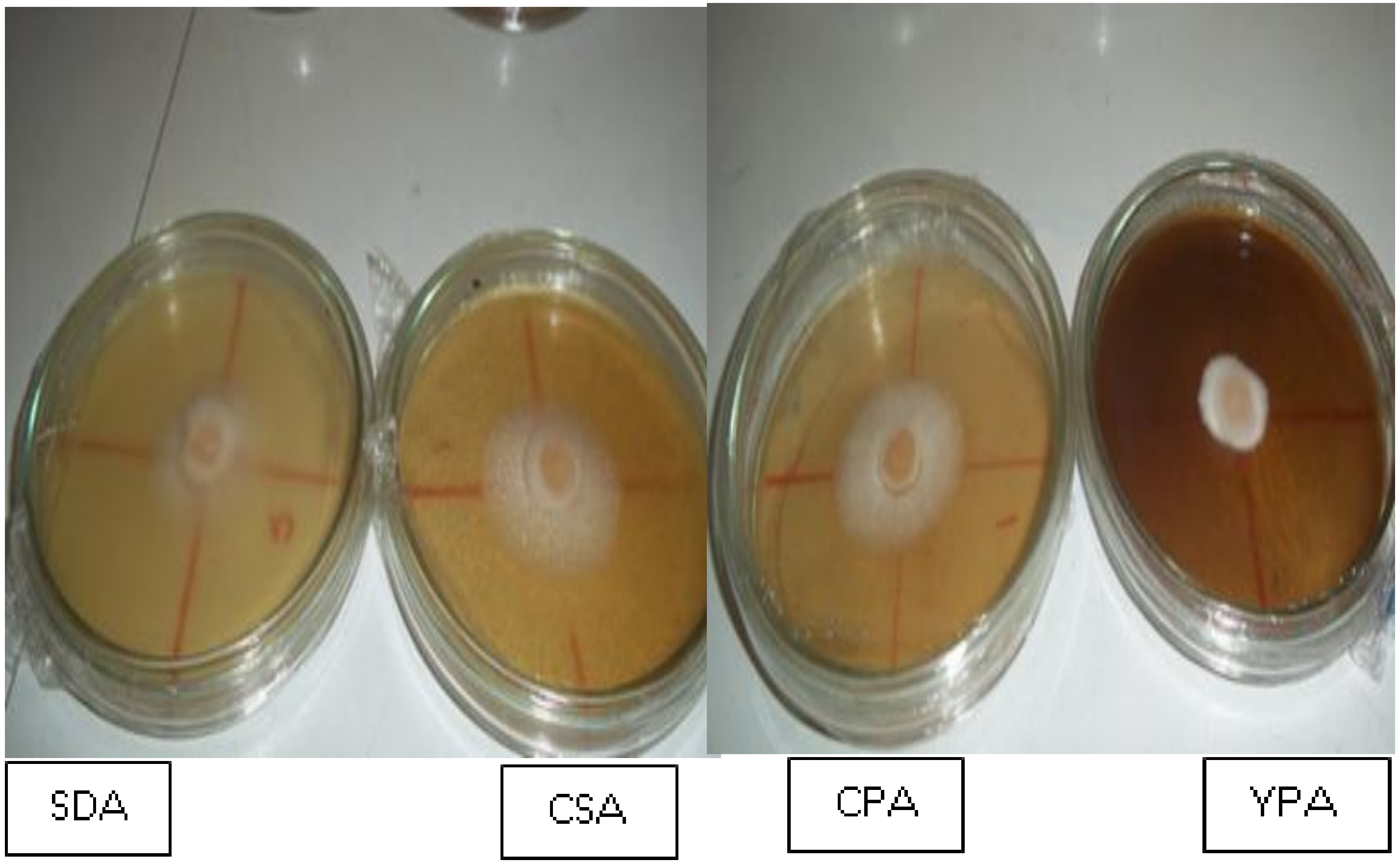

Figure 4b. Morphology of mycelial growth of P. ostreatus MES 03416 on the various solid media on the second day of incubation

- Strain MES 03416 (Fig. 4b), the mycelial morphology on all media showed similar concentric longitudinally radial growth.

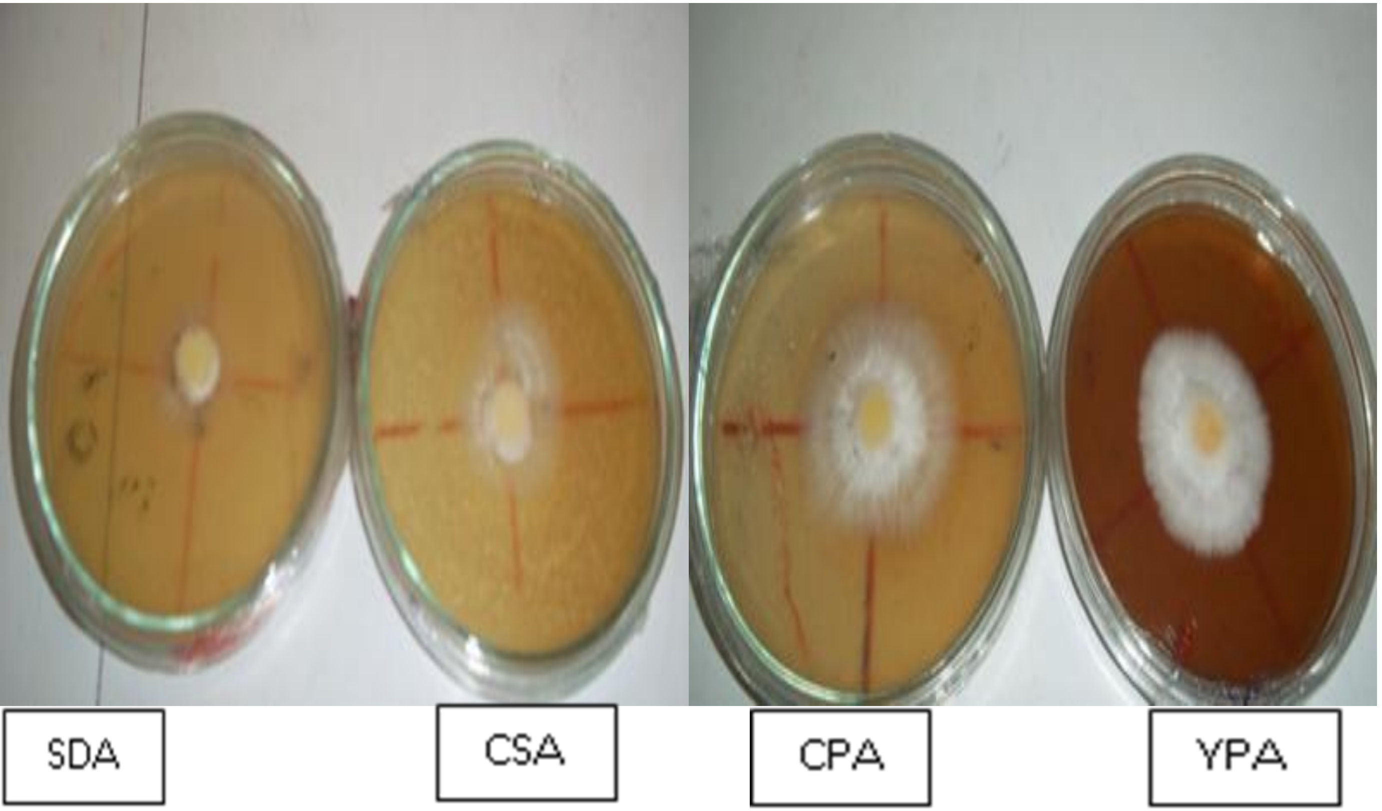

Figure 4c. Morphology of mycelial growth of P. ostreatus MES 03216 on the various solid media on the second day of incubation

- For strain MES 03216 (Fig. 4c, the morphology was different on each different media: SDA, CSA and CPA had longitudinally radial mycelia growth, YPA had a concentric longitudinally radial growth and a dense mycelia but the strain was denser on CPA.

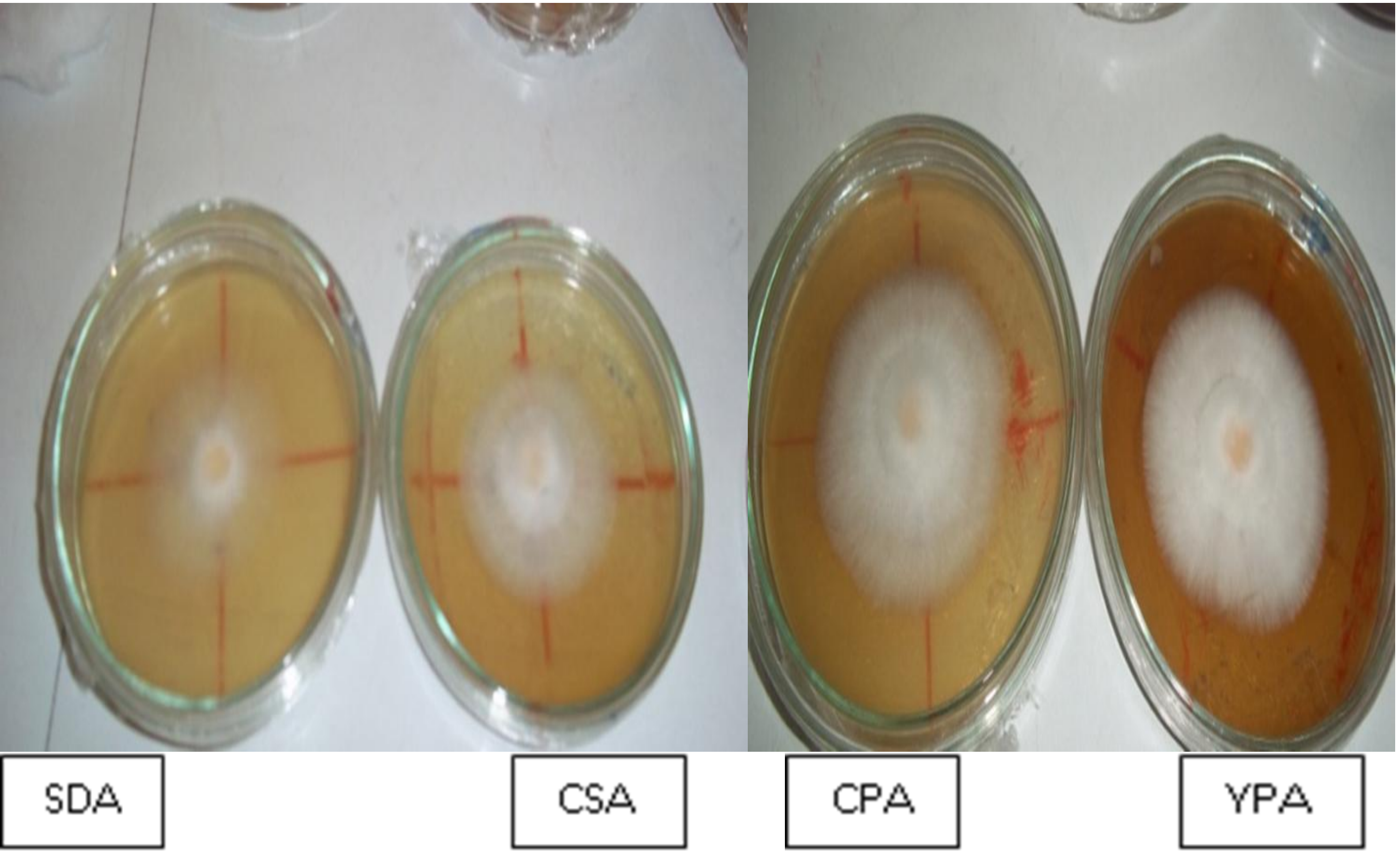

Figure 4d. Morphology of mycelial growth of *L. edodes* MES 12060 on the various solid media on the fifth day of incubation

- The various strains had different morphological characteristics during growth on the different media. The *L. edodes* strain MES 12060 (Fig 4) had clear area (zone) formed at the periphery of the mycelia, this is possibly caused by an exudate from the mycelia

- This was especially pronounced on YPA and is likely to be due to the presence of extracellular enzymes. The morphology of the strain MES 12060 on the medium SDA and CSA both showed a longitudinally radial growth

Conclusion

- Mycelia extension of the various strains varied on various solid media

- Different agar media supported the growth of the different strains of mushrooms with cassava peels agar supporting majority of the strains (*Pleurotus ostreatus* strain MES 11797, 03416, 03772, 03216 and *L. edodes* MES 12060)

- Variations in *L. edodes* and *P. ostreatus* mycelia growth rates are strain and growth media dependent and this may be a general characteristic of mushroom mycelia growth regardless of the species or strain

Team Members

- Obodai, M
- Narh Mensah, D.L.
- Prempeh, J
- Takli, R.K
- Komlaga, G.A
- Dziedzoave, N
- Sonnenberg, A

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THANK YOU!