

**FEASIBILITY OF USING USEFUL BACTERIA TO
ENHANCE THE GROWTH OF EDIBLE
MUSHROOMS UNDER DIFFERENT
CLIMATIC CONDITIONS**

By

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B.Sc. Agric. Sci. (Agric. Microbiology), Ain Shams University, 2003

M.Sc. Agric. Sc. (Agric. Microbiology), Ain Shams University, 2009

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ABSTRACT

Norhan Hassan Abd El-Aziz, “Feasibility of Using Beneficial Bacteria to Enhance Growth of Edible Mushrooms Under Different Climatic Conditions” Unpublished Ph.D. Thesis, Department of Agricultural Microbiology, Faculty of Agriculture, Ain Shams University, 2018.

Five different bacterial strains namely *Peanibacillus. polymyxa* (AT13), *Bacillus circulans* (SD6), *Bacillus megaterium* (PSB), *Azotobacter chroococcum* (A101) and *pseudomonas. fluorescens* (Ps1) were tested for their antagonistic activities against eight edible mushroom strains namely *Straphoria rugoso-annulate*, *Pleurotus sajor-caju*, *Auricularia. sp*, *Lentinula edodes*, *Vollvariella volvacea*, *Pleurotus eryngii*, *Pleurotus ostreatus* and *Pleurotus florida*. Most of the bacterial strains showed antagonistic, effects all the treatments except *Peanibacillus polymyxa* with *P. eryngii*, *P. ostreatus* and *Ps. fluorescens* with *P.florida* which revealed no antagonistic effects between each pair of them. Selected bacterial strains *Peani polymyxa* and *Ps. fluorescens* were examined for some biological activities such as nitrogenase activity, phosphate solubilization, potassium mobilization, production of indole acetic acid, gibberellic acid and cytokinins. The mycelial growth rate of three oyster mushroom strains namely *P. eryngii*, *P. ostreatus* and *P. florida* was examined on six different agar media to select the most suitable one. The mycelia growth of the tested oyster mushroom strains was examined at different pH values, temperatures and different levels of relative humidity on malt extract agar medium. The highest mycelial growth rate was obtained at 25°C and relative humidity of 65% after 6 days of incubation for the three tested oyster mushroom strains. Seven different cereal grains were tested for mushroom spawn production individually or in combinations (1:1). Millet and sorghum treatments showed highest mycelial growth for *P. florida*. Millet and yellow maize showed the best growth as combination treatment for *P. eryngii* and *P. florida*. Twelve different substrates were examined as growth substrates

for mycelial mushroom production. The best effects on mycelial growth were recorded with cottonseed cake followed by cotton seed hull for selected mushroom strains. Ammonium sulphate showed enhancement of mushroom mycelial growth as chemical additive at 0.5% for *P. eryngii* after 12 days on cotton waste as growth substrate. Wheat bran showed the best effects on mycelial growth after 12 days from inoculation on cotton waste, cottonseed cake and corn cob at 20% of wheat bran. While *P. florida* showed the highest mycelial growth on cotton waste at 20% of wheat bran and on maize stalk and sugarcane bagasse at 30%. Biological additives were applied in spawn production stage and mycelial production stage at different levels of microbial inoculants. In spawn production, the best mycelial growth was recorded by adding 1ml of *Peani. polymyxa* on sorghum and millet + yellow maize after 12 days of inoculation for *P. eryngii*. In mycelial production stage, the best mycelial growth was recorded by adding 25% of *Peani. polymyxa* on cotton waste and cottonseed cake for *P. eryngii*. From the previous results all best treatments were applied in yield production stage and showed significant results on growth parameters (total yield, biological efficiency%, spawn run and primordia initiation) and chemical parameters (crude protein%, carbohydrate%, ash% and vitamin C mg/50g fruit bodies and crude fiber%) for selected mushroom strains.

Key words: Edible mushrooms fungi, biological activities, nutrient media, optimal conditions, mycelial growth, organic, chemical and biological additives, biological efficiency%.

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CONTENT

	Pages
I. INTRODUCTION	1
2. REVIW OF LITRATURE	4
2.1. Commonly used terms and general characterizations of mushroom	4
2.2 common species of edible mushroom fungi	5
2.3. Benefits of edible mushroom fungi	6
2.4. Brief history of mushroom production	7
2.5 Factors affecting the growth of mushroom	8
2.5.1 Effect of nutrient media	8
2.5.2. Effect of temperature on the growth of mushroom	9
2.5.3 Effect of pH on mycelial growth of mushroom	10
2.5.4 Effect of moisture on mycelial growth of mushroom	11
2.5.5 Effect of light on mycelial growth of mushroom	12
2.6. Effect of substrate composition on mushroom growth and productivity	13
2.7 Effect of particle size of substrates on mushroom mycelial growth	17
2.8 Effect of different additives on mushroom growth	17
2.9. Effect of different grains on spawn production	21
2.10. Effect of some microbial additives on mushroom growth and productivity.	25
2.11. Applications of spent mushroom compost	27
3. MATERIALS AND METHODS	30
3.1.Materials	30
3.1.1. Tested mushroom strains	30
3.1.2. Tested bacterial strains	30
3.1.3 Substrates for spawn production	30
3.1.4 Substrates for mushroom production	31
3.1.5. Chemical and biological supplements	31
3.1.6. Microbiological media used	32

	Pages
3.2. Methods	41
3. 2. 1 Antagonistic activity	41
3. 2. 2 Determinations of growth promoters	42
3. 2. 2.1 Indole acetic acid (IAA) assay.	42
3. 2. 2.2 Cytokinins determination	42
a- Preparation of cultures for examination	42
b- Preparation of standard curve of cytokinin	42
c- Bioassay of cytokinins	43
3. 2. 2.3 Gibberellic acid determination	43
3.2.3. Enzymatic activities	43
3.2. 3.1 Nitrogenase activity	43
3.2. 3.2 Phosphate dissolving activity	44
3.2.3.3. Potassium mobilization	44
3.2.3.4 Protease activity	44
3.2.3.5 Chitinase activity	45
a- Preparation of colloidal chitin	45
b- The clear zone detection	45
3.2.3.6 Cellulase activity	45
3.2.3.7.Laccase activity	45
3.2.4 Effect of different nutrient media on the growth of tested mushroom strains	46
3.2.5 Effect of different pH levels on the growth of the tested mushroom strains	46
3.2.6 Effect of different temperature degrees on the growth of tested mushroom strains	47
3.2.7 Effect of different relative humidity level (R.H) on the growth of tested mushroom strains	47
3.2.8 Effect of different grains on spawn production	47
3.2.9 Effect of addition of bacterial strains on spawn production	48
3.2.10 Effect of different substrates on mycelia growth of tested mushroom strains	48

	Pages
3.2.11 Effect of different additives on mycelia growth of tested mushroom strains	49
3.2.12 Production of mushroom fruiting bodies	50
3.2.12.1.Effect of the selected bacterial strains on mushroom fruiting bodies production	50
3.2.12.2.Effect of organic and chemical additives on mushroom fruiting bodies production	50
a- Organic additive	50
b- Chemical additive	50
1-Inoculum preparation	51
2-Mother spawn preparation.	51
3-Substrate preparation	51
4-Spawn run	52
3.2.13. Mushroom growth parameters	52
a- Mycelial growth measurement	52
b- Dry matter % determination	52
c -Yield and biological efficiency	52
d- Fruiting bodies weight.	52
e- Spawn run	53
f- Chemical analyses of the fruiting bodies	53
1-Total nitrogen and crude protein	53
2-Crude fiber	53
3-Ash determination	53
4- Total carbohydrate	53
5- Vitamin C determination	53
3.2.14. Statistical analysis	53
4. RESULTS AND DISCUSSION	54
4.1. Antagonistic activity amongst different bacterial and mushrooms strains	54
4.2. Assessment of some metabolic activities of selected bacterial strains	54

	Pages
4.3. Influence of nutritional and climatic conditions on mycelial growth of three oyster mushroom strains	57
4.3.1. Effect of different nutrient media on the linear growth (cm) of mushroom strains <i>P. eryngii</i> , <i>P. ostreatus</i> and <i>P. florida</i> at 25°C during the incubation period.	57
4.3.2 Effect of different pH levels on the linear growth (cm) of selected cultivated mushroom strains on MEA medium at 25°C during the incubation period.	59
4.3.3. Effect of different temperatures on the linear growth (cm) of <i>P. eryngii</i> , <i>P. ostreatus</i> and <i>P. florida</i> during the incubation period	61
4.3.4. Effect of different relative humidity (RH) levels on the linear growth (cm) of <i>P. erengii</i> , <i>P. ostreatus</i> and <i>P. florida</i> during the incubation period	63
4.4. Growth performance of oyster mushroom <i>P. eryngii</i> , <i>P. ostreatus</i> and <i>P. florida</i> grown on different cereal grains during spawn production stage	65
4.4.1 Effect of different cereal grains on the linear growth of oyster mushrooms <i>P. eryngii</i> , <i>P. ostreatus</i> and <i>P. florida</i> during spawn production stage	65
4.4.2 Effect of different cereal grains on nitrogen and dry matter% of <i>P. eryngii</i> , <i>P. ostreatus</i> and <i>P. florida</i> at the end of spawn production stage.	66
4.4.3 Effect of different combinations between cereal grains (1:1) on the linear growth of oyster mushrooms <i>P. eryngii</i> , <i>P. ostreatus</i> and <i>P. florida</i> during spawn production stage	69
4.4.4 Effect of different combinations between cereal grains (1:1) on nitrogen and dry matter% of bed substrates inoculated by mushroom strains <i>P. eryngii</i> , <i>P. ostreatus</i> and <i>P. florida</i> at the end of spawn production stage	69
4.5. Effect of different substrates on the growth performance of	

	Pages
tested mushroom strains during 21 days of the incubation period	74
4.5.1. Effect of different substrates on the linear growth (cm) of white rot edible fungi <i>P. eryngii</i> , <i>P. ostreatus</i> and <i>P. florida</i> during 21 days of the incubation period.	74
4.5.2. Effect of different substrates on nitrogen and dry matter% of bed substrates inoculated by <i>P. eryngii</i> , <i>P. ostreatus</i> and <i>P. florida</i> at the end of the incubation period.	75
4.6. Effect of different chemical additives on the growth performance of selected mushroom strains	79
4.6.1. Effect of different substrates and different concentrations of ammonium sulphate on the linear growth (cm) of <i>P. eryngii</i> during 21 days of the incubation period.	79
4.6.2. Effect of different substrates and different concentrations of ammonium sulphate on nitrogen and dry matter% of bed substrates inoculated by <i>P. eryngii</i> at the end of the incubation period	80
4.6.3. Effect of different substrates and different concentrations of ammonium sulphate on the linear growth (cm) of <i>P. ostreatus</i> during 21 days of the incubation period	83
4.6.4. Effect of different substrates and different concentrations of ammonium sulphate on nitrogen and dry matter% of bed substrates inoculated by <i>P. ostreatus</i> at the end of the incubation period	83
4.6.5. Effect of different substrates and different concentrations of ammonium sulphate on the linear growth (cm) of <i>P. florida</i> during 21 days of the incubation period	87
4.6.6. Effect of different substrates and different concentrations of ammonium sulphate on nitrogen and dry matter% of bed substrates inoculated by <i>P. florida</i> at the end of the incubation period	87
4.6.7. Effect of different substrates and different concentrations	

	Pages
of urea on the linear growth (cm) of <i>P. eryngii</i> during 21 days of the incubation period	92
4.6.8. Effect of different substrates and different concentrations of urea on nitrogen and dry matter% of bed substrates inoculated by <i>P. eryngii</i> at the end of the incubation period.	92
4.6.9. Effect of different substrates and different concentrations of urea on the linear growth (cm) of <i>P. ostreatus</i> during 21 days of the incubation period	96
4.6.10. Effect of different substrates and different concentrations of urea on nitrogen and dry matter% of bed substrates inoculated by <i>P. ostreatus</i> at the end of the incubation period stage.	96
4.6.11. Effect of different substrates and different concentrations of urea on the linear growth (cm) of <i>P. florida</i> during 21 days of the incubation period	99
4.6.12. Effect of different substrates and different concentrations of urea on nitrogen and dry matter% of beds inoculated by <i>P. florida</i> at the end of the incubation period	99
4.7. Effect of different levels of wheat bran as an organic additive on the growth performance of selected mushroom strains	105
4.7.1. Effect of different substrates and different levels of wheat bran on the linear growth of oyster mushroom <i>P. eryngii</i> during 21 days of the incubation period	105
4.7.2. Effect of different substrates and different levels of wheat bran on nitrogen and dry matter %of bed substrates inoculated by <i>P. eryngii</i> at the end of the incubation period.	106
4.7.3. Effect of different substrates and different levels of wheat	

	Pages
bran on linear growth of oyster mushroom <i>P. ostreatus</i> during 21 days of the incubation period	109
4.7.4. Effect of different substrates and different levels of Wheat bran on nitrogen% and dry matter% of bed substrates inoculated by <i>P. ostreatus</i> at the end of the incubation period.	109
4.7.5. Effect of different substrates and different levels of wheat bran on the linear growth of oyster mushroom <i>P. florida</i> during 21 days of the incubation period	113
4.7.6. Effect of different substrates and different levels of wheat bran on nitrogen and dry matter %of bed substrates inoculated by <i>P. florida</i> at the end of the incubation period	113
4.8. Effect of different levels of different microbial inoculants as biological additives on the growth performance of selected mushroom strains during spawn production stage	119
4.8.1 Effect of different cereal grains supplemented by different doses of <i>Peani. polymyxa</i> on the linear growth of oyster mushroom <i>P. eryngii</i> during spawn production stage	119
4.8.2 Effect of different cereal grains supplemented by different doses of <i>Peani. polymyxa</i> on nitrogen and dry matter% of bed substrates inoculated by <i>P. eryngii</i> at the end of spawn production stage	120
4.8.3 Effect of different cereal grains supplemented by different doses of <i>Peani. polymyxa</i> on the linear growth of oyster mushroom <i>P. ostreatus</i> during spawn production stage	123
4.8.4 Effect of different cereal grains supplemented by different doses of <i>Peani. polymyxa</i> on nitrogen and dry matter% of bed substrates inoculated by <i>P. ostreatus</i> at the end of spawn production stage	123

	Pages
4.8.5 Effect of different cereal grains supplemented by different doses of <i>Ps. fluorecens</i> on the linear growth of oyster mushroom <i>P. florida</i> during spawn production stage	127
4.8.6 Effect of different cereal grains supplemented by different doses of <i>Ps. fluorecens</i> on nitrogen and dry matter% of bed substrates inoculated by <i>P. florida</i> at the end of spawn production stage.	127
4.9. Effect of different levels of different microbial inoculants as biological additives on the growth performance of selected mushroom strains.	132
4.9.1. Effect of different growth substrates supplemented by different doses of <i>Peani. polymyxa</i> on the linear growth of oyster mushroom <i>P. eryngii</i> during 21 days of the incubation period	133
4.9.2. Effect of different growth substrates supplemented by different doses of <i>Peani. polymyxa</i> on nitrogen and dry matter %of bed substrates inoculated by <i>P. eryngii</i> at the end of the incubation period	133
4.9.3. Effect of different growth substrates supplemented by different doses of <i>Peani. polymyxa</i> on the linear the growth of oyster mushroom <i>P. ostreatus</i> during 21 days of the incubation period	137
4.9.4. Effect of different growth substrates supplemented by different doses of <i>Peani. polymyxa</i> on nitrogen and dry matter %of bed substrates inoculated by <i>P. ostreatus</i> at the end of the incubation period	137
4.9.5. Effect of different growth substrates supplemented by different doses of <i>Ps. fluorescens</i> on the linear growth of oyster mushroom <i>P. florida</i> during 21 days of the incubation period	140