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CULTIVATION OF EDIBLE MUSHROOM (*AGARICUS BISPORUS*) IN SOME MANUFACTURING WASTES OF FOOD[+]

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Abstract

The present study to uses food manufacturing wastes mixed with different levels of mung bean straw for the growth of edible mushroom.Results indicate that mung bean straw is possible to be mixed , but it should not be more than 50% of the composition of the growth medium which is prepared by mixing with wheat at different levels.

Total yield of four flushes grown in wastes peas, broad bean and beet pulp mixed with mung bean straw was almost similar , it reached 2.56 , 2.36 , 2.00 , 0.64 and zero kg/10kg waste compost respectively when waste was added to mung bean straw at 0 , 25 , 50 , 75 and 100% respectively. It is concluded that some food manufacturing wastes could be added to mung bean at ratio 1:1 for edible mushroom growth.

المستخلص

استهدفت الدراسة استخدام مزيج من مخلفات التصنيع الغذائي بمستويات مختلفة لغرض تنمية فطر *Agaricus bisporus* .اظهرت نتائج البحث امكانية استخدام تبن الماش بنسبة ٥٠ % مع مخلفات التصنيع الغذائي لخلق الاوساط الغذائية البادئة والتي تم تحضيرها بالخلط مع حبوب الحنطة بمستويات مختلفة .كانت كمية الناتج النهائي الى الحاصل للاوساط الغذائية مساوياً تقريباً الى مخلفات البزاليا ،الباقلاء ولب البنجر المخلوط مع تبن الماش وبلغت ٢,٥٦، ٢,٢٦، ٢ ، ٠,٦٤ و صفر كغم / ١٠ كغم على التوالي عند اضافة المخلفات بنسبة صفر ،٢٥ ،٥٠ ،٧٥ و ١٠٠% على التوالي .

يستنتج من البحث امكانية اضافة مخلفات التصنيع الغذائي في تنمية الفطر بنسبة تصل ١:١ مع تبن الماشي في تحضير الاوساط الزرعية .

Introduction

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Mushroom is considered as the oldest fungus growth on plants and animals wastes[1] it is most favourable fungus to eat for its flavour, high nutritive value and medical effect [2]. It is rich in protein, vitamins, minerals and low in cholesterol and calories [3] .

The most important cultural mushroom are *Lentinu, Pleurotus and Agaricus* which form 33% of total mushroom world production[4].

Growing technique of edible mushroom has succeedcd in different parts of world: it has been grown on plants and animals wastes and farmers strains are adapted to various climatic conditions [5], therefore the future of edible mushroom seems to be more promising.

[6] mentions the substrate preparation for white button mushroom, these substrate include vegetables and fruits wastes which provide a reservoir of cellulose, hemicellulose and lignin also supply activating growth used as a source of carbon and nitrogen.

Available nutrients such as nitrate ammonium sulfate and urea are added as nitrogen source media including some minerals such as super phosphate, potash and gypsum [7].

This study aims to find out the possibility of usage of food wastes to grow edible mushroom and select the best wasts that are locally available for mushroom production. and also to increase food supply in third world as source of protein and improve the nutritional value such wastes for animal feeding.

Material and Methods

Agaricus bisporus spores were obtained from atomic energy organization. The culture was maintained monthly on potato dextrose yeast agar (PAD) medium, after growth they were storaed in a refrigerator.

Three wastes residues (peas, broad bean, beet pulp) were used in different levels with mung bean straw (Table 4) to prepare mushroom growth media.

The mixture was soaked in water until the moisture content reached about 75% then wheat bran and limestone were added in 2% to each treatment and the mixture was packed in plastic attached, steamed at 70C(for 8 hours then cooled to 25C) to be ready for spawning.

Spawn preparation was done according to [8] method and spawn was added to compost media in 2% .Several media were used (table 5) for cultivation in a 1000ml flask capacity, 200 gm wheat, 12 gm $CaCO_3$, were added to 240 ml distilled water.

The media were sterilized for one hour with 6% CaCO3, cooled, after 1 – 2 days, later the medium was inoculated and incubated at 24 – 25 C^o for 1 – 2 weeks then stored at 2 – 3 C^o until use.

Crude protein, crude fibers, moisture content, ether extract, ash and carbohydrates were determined according to [9] methods.

Results and Discussion

Table (1). shows the chemical analysis of wastes used in the research, it looks that beet pulp, broad bean and mung bean straw residues are rich in organic carbon and poor in nitrogen content, while the C/N ratio is not less ther 17/1 at these wastes reached (26–57%) , crude fiber (23 – 27.5%) and ash was (3 – 12.5%), the highest amount of ash was in mung bean straw compared with other wastes.

These investigations demonstrated the importance of high cellulose, hemicellulose, lignin substrate with a high C/N ratio which is required to produce a high mushroom yield [10].

Table (2). shows growth of *A . bisporus* on different spawn media, heavy dense growth had been seen on wheat grain medium on the other hand heavy growth was observed when 25 or 50% of beet pulp, peas or broad bean wastes were mixed with wheat grains.

Moderate growth was noticed with 75% percentage and no growth on zero percentage without adding wheat grains. these results are in aggrement with [11].

It is concluded that some food wastes could be successfully mixed with wheat grain to produce mushroom spawn with low cost.

Table (3). shows that media containing mixture of mung bean straw with food wastes (3:1 and 1 :1) gave better yields compared with mixture of (1:3) ratio since total yield giv decreases from 2.00 to 0.64 kg/10 kg waste compost .

On the other hand 100% waste as source of cellulose gave no yield, whereas mung bean straw cellulose gave high yield alone or mixed with wastes, the results show the significant source (0.64kg/10kg waste compost) of cellulose containing substances and nature of nitrogen source affected yield and growth of *Agaricus bisporus* mushroom.

Table (1): Main constituents of wastes used for mushroom rowing (% on dry wt. basis)

Wastes	Moisture	*Carbohydrates	Total nitrogen	C/N	Crude fibers	Ether Extract	Ash
Peas	7.20	50.20	1.94	25.88	24.15	3.50	2.85
Broad bean	6.10	51.20	1.79	28.60	23.15	3.23	5.16
Beet pulp	7.06	58.81	1.06	55.50	22.8	0.42	4.31
Mung bean straw	5.20	48.19	0.85	56.70	27.46	1.35	12.5

* carbohydrates were calculated by difference

Table (2): Growth of Agaricus bisporus spawn in wastes Growth Density after 14 days

Wastes	Wheat waste	100% 0%	75% 25%	50% 50%	25% 75%	0% 100%
Peas		++++	++	++	+	-
Broad bean		++++	+++	+++	+	-
Beet pulp		++++	+++	+++	++	-

(-) no growth (+) Weak growth (+ +)moderate growth (+ + +) dense growth (+ + + +) heavy dense growth

Table (3): Yield of mushroom (*A. bisporus*) growning in different wastes (kg/10kg waste compost)

Flush No	100% straw	75% straw 25% waste		50% straw 50% waste				25% straw 75% waste			100% wastes
		Peas	Broad bean	Beet Pulp	Peas	Broad bean	Beet Pulp	Peas	Broad bean	Beet Pulp	
1	1.00	0.92	0.95	0.85	0.82	0.80	0.75	0.33	0.3	0.22	00.0
2	0.76	0.70	0.78	0.65	0.55	0.5	0.48	0.24	0.2	0.18	00.0
3	0.50	0.48	0.48	0.42	0.40	0.41	0.35	0.10	0.08	0.08	00.0
4	0.30	0.28	0.30	0.28	0.20	0.20	0.22	0.06	0.05	0.04	00.0
Total yield	2.56	2.38	2.51	2.20	1.97	1.91	1.80	0.73	0.63	0.52	00.0

Table (4): Waste percentage used with mung bean straw for compost preparation

Wastes	Constituents of different mushroom compost												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Peas	-	25	-	-	50	-	-	75	-	-	100	-	-
Broad bean	-	-	25	-	-	50	-	-	75	-	-	100	-
Beet pulp	-	-	-	25	-	-	50	-	-	75	-	-	100
Wheat	100	75	75	75	50	50	50	25	25	25	-	-	-

Table (5): Waste percentage used with wheat for spawn preparation

Wastes	Constituents of different media												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Peas	-	25	-	-	50	-	-	75	-	-	100	-	-
Broad bean	-	-	25	-	-	50	-	-	75	-	-	100	-
Beet pulp	-	-	-	25	-	-	50	-	-	75	-	-	100
Wheat	100	75	75	75	50	50	50	25	25	25	-	-	-

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