

Mushroom Fungus Production (Pleurotus Ostreatus) in Residue Agroindustrial (Maguey Bagasse) in Villa Sola de Vega as an Alternative for Local Development

Alejandrina Ramírez Santos, Analine Cabrera Aragón

(Area of Administration Formulation and Evaluation of Projects, Technological University of the Sierra Sur of Oaxaca, Mexico)

Abstract: This project proposes the use of bagasse for the production of mushroom fungus (Pleurotus ostreatus), as a source of substrate in order to take advantage of the waste generated in the production of mezcal. It took place in Villa Sola de Veja, Oaxaca. Mushroom fungus is considered to be a nutritional supplement with a high nutrition value. For the production was considered the bagasse of Maguey, because in this community there is production of mezcal and waste is not used. This activity contributes to the generation of employment, the use of endogenous resources. The project was carried out in two phases; In the first, the methodology of Dr. Roberto Hernández Sampieri was applied, the second was selected the substrate of Maguey bagasse, pasteurisation of the substrate, sowing, incubation of the mycelium, irrigation, harvesting and commercialization of mushroom fungus. Under these circumstances, 93 kilograms in three cuts were obtained for two months, at a price of \$100.00 per kilogram. For which an investment of \$2,721.26 was required, with production costs \$4,587.00, generating sales of \$9,300.00, recovering the investment in the first production period, in such a way that the profits correspond to \$1,991.74. As a conclusion we have to continue the project EM a second period the profits increases to \$4,713.00, since only the costs of production will be covered, in this way there is an economic, social and environmental equilibrium that improves the living conditions of families and the environment.

Key words: substrate; endogenous; economic; social; environmental **JEL codes:** O10, R11, F18

1. Introduction

The fungus mushroom (Pleurotus ostreatus) is located within the first three places of production and consumption worldwide, this due to its pleasant taste and its high nutritional qualities and food. For producers, it is a highly profitable business, as it presents short production cycles, and using agro-industrial waste as a substrate for cultivation, since in Villa Sola de Vega for the high production of mezcal is generated maguey bagasse that can

Alejandrina Ramírez Santos, Teacher at administration, Area of Formulation of the Administration and Evaluation of Projects, Technological University of the Sierra Sur of Oaxaca; research areas: market, business finance and economic development. E-mail: alesitamr_27@hotmail.com.

Analine Cabrera Aragon, Teacher at administration, Area of Formulation of the Administration and Evaluation of Projects, Technological University of the Sierra Sur of Oaxaca; research areas: market, business finance and economic development. E-mail: ana_lyne@hotmail.com.

Mushroom Fungus Production (Pleurotus Ostreatus) in Residue Agroindustrial (Maguey Bagasse) in Villa Sola de Vega as an Alternative for Local Development

Be tapped into the mushroom production. This product has a wide market, with a constant demand, constitutes an alternative in the production of food in the real medium, since it does not affect the activities carried out in the productive sector and also does not damage its ecological environment. Simple and easy-to-use techniques allow the integration of production with consumption, avoiding the intermediation that affects the basic products, also allows women to actively participate in the productive process. It is an alternative for producers because direct and indirect jobs are generated by improving their economy.

2. Literature Review

2.1 History of Mushroom Fungus

The term seta is applied in Mexico to refer to fungi (Pleurotus ostreatus) But these fungi are also popularly known as white ears, stick ears, ears of patancan, ears of cazahuate and ears of izote. Mexico is pioneer in the cultivation of mushrooms in Latin America, this activity began in the years 70 since then the interest in its propagation and consumption has been increasing, due to the relative ease of cultivation of mushrooms and the consistency of mushrooms often they d Enomina as vegetable meat, because they can easily adapt to different culinary presentations and their nutritional value compared with other foods is acceptable, these characteristics make the mushrooms a complement alimentico of great value. They grow naturally in rotting logs or EM different materials obtained as byproducts of agricultural activities (Mora, 2008).

2.2 General Characteristics of Mushrooms

The mushrooms are fungi that are developed mainly on logs in decomposition or other vegetal substrates, each fungus is formed by a series of fine filaments called hyphae that joint em form what is called mycelium. In nature and under favorable conditions of humidity and temperature this mycelium spread over a suitable substrate is transformed into small grams that are increasing in size to form the typical mushroom. The fungus formed with its hat and its foot has the function of producing the structures of production called spores whose mission is to perpetuate the species. These spores form on the underside of the hat in some vertical lamellas that extend from the top of the foot to the edge of the hat.

The fungus em general are known for their umbrella shape, with a more or less circular hat and a shaft or foot that holds it but for the case of the mushrooms this foot is more lateral than centric, so its development is given in the form of an oyster or ear, in fact this fungus is technically called Pleurotus ostreatus term that derives from the Greek pleura or pleuron, side or side and of the Latino tus, ear (Sanchez, 2001).

2.3 Nutritional Value of Mushroom Fungus

At food level, edible fungi have twice as much protein content as vegetables and have the nine essential amino acids, with leucine and lysine, absent in most cereals. They also have high amounts of minerals, low calorie content and carbohydrates. They are also characterized by having medicinal properties such as producing retardation in tumor growth, lowering blood cholesterol levels, possessing antioxidant and immunomodulatory substances (Romero et al., 2000).

Fungi are an excellent source of vitamin B such as thiamine (B1), riboflavin (B2), nicotinic acid, and pantothenic acid. It is reported that vegetables are a very poor source of vitamin B12, the deficiency of which can cause anemia. It has been shown that approximately 3 g of fresh fungi can provide daily intake of vitamin B12 (Rajarathnam & Bano, 1993).

2.4 Maguey Bagasse

Agave bagasse is the fibrous residue left after the cooked agave heads are shredded, rinsed and squeezed to extract the fermentable sugars for the production of mezcal. Bagasse is mainly composed of heterogeneous fibers 10 to 12 cm long and non-fibrous organic material in the form of fine particles (medulla) corresponding to the crust and fibrovascular wrapper scattered in the interior of the head of the agave plant (Iñiguez et al., 2007).

2.5 Stages of Mushroom Fungus Production

2.5.1 Pasteurization

It consists of eliminating the main substrate contaminants by means of dry or humid heat (hot water vapour). Exposure times for steam pasteurization are 2-3 hours at 75°C or 12-18 hours at 60°C. In terms of pasteurization with hot water, the substrate is subjected for a period of 30-45 minutes at a temperature of 80°C (Ville, 2002).

2.5.2 Type of sowing

There are different planting methods, the most common is the use of polyethylene bags of 70×90 cm. The mycelium is mixed or innocuous with the substrate, alternating a layer of this with a layer of seed the bags that have finished sowing are closed making a knot crossing em the top trying to not get too much air inside them and the temperature adapted A of the substrate must be 24-25°C (Gaitán, 2006).

2.5.3 Incubation

The incubation period is a lapse between sowing and the development of fungi, the bags should remain after sowing in dark conditions and at an ambient temperature less than 30°C DURANTE10-15 days. A practical way to provide these conditions is to stack the bags to generate heat. Once the fungus has been sown it starts its growth on the substrate, until it completely invades the whole bag (Ville, 2002).

2.5.4 Irrigation

It can be carried out manually or by sprinkling, once or twice a day to avoid the drying of the substrate (Escobar et al., 2002).

2.5.5 Harvest

The first harvest is made from the 25th to the 40 depending on the climatic conditions, when the fungi have reached the physiological maturity that is characterized by a diameter of 10 cm, of length of 8 A12 cm and with a variable weight of 50 to 80 grams. The harvest must be done at the right time to prevent the mushrooms from dehydrateing quickly or rotting and losing the desired organoleptic characteristics. When harvesting, the bodies should be cut, not plucked and placed in trays for use and handling (Adame, 2008).

3. Case Study

3.1 The Methodology Was Based on Two Phases: Cabinet and Field.

The methodology was developed under the criteria of Dr. Roberto Hernández Sampieri (2006) (Figure 1). This research is delimited in the local area of Villa Sola de Vega, Oaxaca in the Sierra Sur regi.

Mushroom Fungus Production (Pleurotus Ostreatus) in Residue Agroindustrial (Maguey Bagasse) in Villa Sola de Vega as an Alternative for Local Development



3.2 Results

The project was developed with the production of 15 kilograms of mycelium, different materials and auxiliary equipment were required such as: pots, scales, among others. Forming cakes of 6 layers of substrate, the first layer was 4 cm, adding the seed around the entire layer and the remaining 5 layers were 3 cm. We obtained a production of 93 kilograms, distributed in 60 bags. An investment of \$2,721.26 was required (Table 1), Production costs \$4,587.00 (Table 2), generating sales of \$9,300.00 (table 3), recovering the investment in the first production period. The price per kilogram is \$100.00, with a profit margin of 61%. The project involves four women housewives who took the initiative to start this production, which will generate an income.

		Concepts	Total in Mexican Pesos	
Α	Fixed Asset		2,721.26	
	1	Equipment	1,321.00	
	1.1	Digital scale of 1 kg.	300.00	
	1.2	Table	500.00	
	1.3	Raffia	90.00	
	1.4	Scissor	8.00	
	1.5	Atomizer	100.00	
	1.6	Needle	1.00	
	1.7	Matches	2.00	
	1.8	Pot	200.00	
	2	Safety Equipment	60.00	
	2.1	Gloves	30.00	
	2.2	Mask	30.00	
В	Subtotal		2,642.00	
С		Unplanned (3 % of total fixed assets)	79.26	
D	Total		2,721.26	

Table 1	Investment	Budget
---------	------------	--------

Source: field research.

Mushroom Fungus Production (Pleurotus Ostreatus) in Residue Agroindustrial (Maguey Bagasse) in Villa Sola de Vega as an Alternative for Local Development

	Table 2 Production Costs					
		Initial Capacity	Total			
	Concep	ts	2,487.00			
Α	Variable Cost		80.00			
	1	Wood	16.00			
	2	alcohol	16.00			
	3	Clarasol	10.00			
	4	Lime	750.00			
	5	Mycelium	5.00			
	6	Nailo	45.00			
	7	Poly Bags Paper 50x 40 cm	60.00			
	8	Maguey bagasse Substrate	625.00			
	9	Dishes (Container)	180.00			
	10	Plastic bonding	700.00			
	11	Direct Labour				
В	Fixed Costs		2,100.00			
	1	Local income	1,800.00			
	2	Indirect Labor	300.00			
С	Production Cost		4,587.00			

Table 1 shows the production equipment, materials and safety equipment required for production, corresponding to an investment of \$2,721.26, to produce 93 kilograms of mushroom fungus.

Source: field research.

Table 2 refers to inputs, packaging, income from the production area, direct and indirect labor to develop the production process. Overall costs were \$4,587.00, producing 93 kilograms deducting a unit cost of \$49.52.

Table 5 Mushi voli Fungus Sales						
	Cuts					
United	1	2	3	Ingresos Totales		
Kg. Per bag	36	30	27		93.00	
Price	100.00	100.00	100.00	100.00		
Total	3,600.00	3,000.00	2,700.00	9,300.00		

Table 3 Mushroom Fungus Sales

The three cuts are broken down in Table 3; The first produces 36 kg, 30 kg and 27 kg respectively. The product was offered in the market at a price of \$100.00, which was analyzed under costs and the customers obtaining sales of \$9,300.00.

4. Conclusion

The production of edible fungi is an important alternative to meet the nutritional needs of the population; In addition to taking advantage of agro-industrial waste as is the case of scrap bagasse in the mezcal production process in the municipality of Villa Sola de Vega. The process does not require more effort, however, of many care and intensive supervision to avoid pests and diseases, so that the product meets the requirements of consumers. As a conclusion we have to continue the project in a second period the profits increases to \$4,713.00, because only the costs of production will be covered, in this way there is an economic, social and environmental equilibrium

that improves the living conditions of families and the environment.

References

- Sánchez V. et al. (2009). "Edible mushrooms in southeastern Mexico", in: Towards a sustainable development of the production-consumption system of edible and medicinal fungi in Latin America: Advances and Perspectives in the 21ST century, in: D. Martínez-Carrera, N. Curvetto, M. Sobal, P. Morales & V. M. Mora (Eds.), *Latin American Network of Edible and Medicinal Fungi-COLPOS-CONACYT-UNS-UAEM-IMINAP*, Puebla, pp. 277-293.
- Escobar J. (2002). "Special programme on food security in coordination INTECAP-FAO-PESA", Spanish cooperation, Jovotan, available online at: http://www.fao-sict.un.hn/documentos_interes/19_permacultura_aplicada.pdf.
- Pacheco A. et al (2005). "Estimation of the demand of Pleurotus Ostreatus em the state of Yucatan Mexican magazine of Agribusiness", Sociedad Mexicana de Administración Agropecuaria A.C. Torreón, Mexico, Vol. IX, No. 17.
- Adame M. (2008). "Production of mushroom fungus (Pleurotus ostreatus) using reuse paper as substrate", thesis of engineering in biotechnology, Polytechnic University of the State of Morelos (UPEMOR), Jiutepec, Morelos, p. 56.
- Sampieri Robert (2006). Research Methodology, Mc Graw Hill, Mexico.