CULTIVO DE PLEUROTUS COLUMBINUS SOBRE VAINAS DE LUPINUS ANGUSTIFOLIUS ADICIONADAS CON RASTROJO DE MAÍZ

GROWING ON PODS PLEUROTUS COLUMBINUS LUPINUS ANGUSTIFOLIUS ADDED WITH CORN STOVER

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Resumen

Lupinus angustifolius está adquiriendo importancia debido al alto contenido de proteínas en el grano (35 a 40 %). En México se cultiva como una fuente de proteínas para la alimentación; sin embargo, solo se aprovecha la semilla. Por su parte, los tallos y vainas generan un desecho aproximado de 16 toneladas por hectárea. En este trabajo se utilizaron las vainas de *L. angustifolius* como substrato para cultivar *Pleurotus columbinus*. El método fue pasteurizar en agua caliente a 80° C y posterior inoculación. Las eficiencias biológicas fueron T5 con 58.95 %, T1 con 66.43 %, T3 con 71.90 %, T2 con 81.65 %, y la más alta T4 con 96.80 %. Se determinó que las vainas de *L. angustifolius son un substrato adecuado para P. columbinus,* sin embargo, es necesario suplementarlas con rastrojo de maíz, ya que se observó un incremento en la eficiencia biológica en comparación con las vainas al 100 %.

Palabras clave: Lupinus, Pleurotus columbinus, cultivo.

Abstract

Lupinus angustifolius is gaining importance due to the high content of proteins in grain (3540%). In Mexico it is cultivated as a source of protein for food; however, the seed alone takes advantage. For its part, the stems and pods generate an approximate disposal of 16 tons per hectare. In this work we used pods of L. angustifolius as substrate for cultivating Pleurotus columbinus. The method was to pasteurize in hot water at 80° C and after inoculation. Biological efficiencies were T5 with 58.95%, T1 with 66.43%, T3 with 71.90%, T2 with 81.65%, and high T4 with 96.80%. It was determined that pods of L. angustifolius is a substrate suitable for P. columbinus, however, is necessary to shimming with Corn Stover, since there was an increase in biological efficiency in comparison with the pods 100%.

Key words: Lupinus, Pleurotus columbinus, cultivation.

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Introduction

Mexico is one of the first growers of Pleurotus spp. in Latin America, activity that began in the nineties, thanks to the convenience and relatively easy to grow these mushrooms (1). Mexico produces about 47 468 tons of mushrooms annually and the ecological importance of this economic activity lies in the use and recycling of more than 474 000 tons of agricultural, agro-industrial by-products and forestry (2). Among the works that have been documented of cultivation of Pleurotus on various wastes, biological efficiency of 35 to 159% are obtained (1).

According to consulted (3), in Mexico are used 20 different agricultural or agro-industrial origin substrate for the cultivation of Pleurotus spp. However, there are other waste compounds by lignin or cellulose, as it is the case of carton, paper, newspaper, and textile products. There are also substrates with potential to be used in the cultivation of Pleurotus, which are carried out experimental studies, as it is the case of cellulosic casings of sausage packaging (4).

Legumes of the genus Lupinus are cultivated in different countries, due to the high content of proteins in grain (35-40%). In Mexico there is keen to promote its culture, since it represents an alternative source of protein for animal and human consumption. However, given that only the seed is needed, the stems and pods generate waste approximately 12 to 16 tons per hectare, which affects farmers who lack options to get rid of these wastes accumulate in landfills and areas of cultivation, creating pest and various contaminants that affect their health and their lands (5). For this reason, this work used pods of Lupinus angustifolius as substrate for cultivating Pleurotus columbinus and thus help their recycling and obtain a food for human consumption.

Methodology

This work was done in the area of cultivation of edible and medicinal mushrooms Department of Botany and Zoology at the University of Guadalajara. Lupinus angustifolius pods were obtained after harvesting the seeds of a culture established in the experimental agricultural field the University Center for Biological and Agricultural Sciences. The strain of P. columbinus is deposited in mycological culture collection area mushroom and preserved at 4 ° C. The inoculum was prepared from grain sorghum in polypropylene bags (6).

Dry L. angustifolius pods were fragmented in a blade mill with a sieve of 2 cm diameter to allow handling during culture. 5 treatments pods mixing with corn stover in different proportions, which can be observed in Table 1 were performed.

Table 1. Treatments were conducted with pods of L. angustifolius and corn stover**.**

Tratamiento	*V. L. (%)	**R. M. (%)	Agua (l)	***M. S. V. (kg)	****M. S. R. M. (kg)
T1	100%	0%	20	6.0	0
T2	75 %	25 %	20	4.5	1.5
T3	50 %	50 %	20	3.0	3.0
T4	25 %	75 %	20	1.5	4.5
T5	0 %	100 %	20	0	6.0

* Lupinus pods, corn stover **, *** dry matter of pods **** dry matter corn stover.

Subsequently each of the treatments was pasteurized in hot water at a temperature of 80 ° C for 45 min, this with the help of a metal drum of 200 liters capacity. Once the excess water was drained, the pods were placed in a wooden table for cooling and subsequent inoculation with P. columbinus strain (6). Mycelium hatching transparent polyethylene bags X 60 cm to 40 which were added 4 kg of the inoculated substrate were used. Five replicates per treatment were made. The incubation temperature was 28 ± 2 ° C in a darkened room until the appearance of fruiting. Once fruiting occurred, the bags were transferred to the living harvest, where conditions were indirect natural light, 80% humidity and ventilation 4 changes per hour; Also, the temperature was 20 ± 2 ° C. Once the fruiting bodies were mature, were harvested and weighed for evaluation. The production of fruiting

was evaluated Efficiency Biological formula that relates the fresh weight of the dry matter mushroom substrate (7).

Results and discussion

Mycelial growth of P. columbinus had a positive response to growing on pods L. angustifolius and mixtures made since it invaded the substrates in a period of 21-25 days, like those reported with other agricultural residues employees. (3). However, fruiting occurred between 40 and 45 days, which is a very long period, as in the case of Pleurotus species occurs between 28 and 30 days (1). According to Ruiz-López (5), examinations carried lignin concentration pods Lupinus show that they contain a high percentage of said compound and do not allow a rapid growth because oxidative capacity is very low columbinus P. , which can be seen in the formation of a layer of type sclerotium mycelium (8).

Table 2 shows the results of production of fruiting bodies of P. columbinus under different treatments. Treatment (T1) of 100% of L. angustifolios pods had average production 611.12 g, 751.15 g had T2, T3 with 661.4 g was generated, had T4 T5 890 g and 542.35 g resulted. It is noteworthy that these results were obtained from a single harvest, as sclerotia formed because there were no more fruiting bodies harvested. Regarding biological efficiencies, the lowest was obtained with T 5, which gave 58.95%, followed by T1 with 66.43%. The T3 treatment resulted in 71.90% and the 81.65% T2 occurred. The highest efficiency was obtained with biological T4 averaging 96.80%. These efficiencies are within the ranges reported on various substrates (1, 2, 3). These differences are due to production sclerotia formation as much energy is spent formation and depends greatly on the thickness of the formed tissue. This is based on the delay in the onset of fruiting (8). It was observed

that in treatments with pods had carpophores larger, between 15 and 18 cm compared to the control treatment fruiting (T5) of 10 and 12 cm (fig. 1).

Table 2. Production of fruiting and biological treatments efficiencies obtained with P. columbinus and pods of L. angustifolius.

Tratamiento	Producción (g)	Eficiencia Biológica (%)
T1	611.12	66.43
T2	751.15	81.65
T3	661.4	71.90
T4	890.55	96.80
T5	542.35	58.95

Figure 1. carpophores obtained on pods L. angustifolius and mixed with corn stover.

Conclusions

Found that L. angustifolius pods allow mycelium growth of P. columbinus and fruiting production, however, it is necessary to supplement them as corn stover biological increased efficiency was observed compared with the 100% pods. Moreover, the period for the fruiting is very long, so this aspect should be improved. Also, the mycelium of P. columbinus accelerates the return of the pods to the ground.

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