

## Support for Poverty Alleviation through Mushroom Farming: The MushWorld Foundation's Case

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**Abstract:** Mushroom cultivation has been regarded as an effective means for poverty alleviation in less-developed countries thanks to its potential for a quick, high profit-return on a low investment. In this regard, many international organizations have made various efforts to facilitate mushroom growing in these countries, and the MushWorld Foundation is one of them. This paper, in which the MushWorld Foundation's projects are discussed, offers a good example of how a private non-profit organization can contribute to the fight against poverty. The main mushroom promotion activities at the MushWorld Foundation include distributing free access to mushroom information, maintaining a mushroom information hub, and providing technical and financial support for potential new mushroom growers. The MushWorld Foundation believes that these activities, including an even greater future participation of established mushroom professionals and growers, will greatly encourage and promote mushroom growing in poverty-stricken areas, as a result of which more people will be able to pull themselves out of their poverty and improve their standards of living.

**Key words:** Mushroom farming, poverty alleviation, MushWorld Foundation, international organizations, mushroom information hub

### 1 Introduction

During this current age of unprecedented wealth and technological advancement, the world is also home to at least 700 million people who do not have enough food to eat. In some African countries, more than half of the population lives with HIV/AIDS. The severe global hunger epidemic is rooted in poverty and the generation of excessively low income. An increasing number of the affected population live on less than 1 dollar (USD) a day in the less developed countries (LDCs), most of which are agriculture-driven economies. In 1999, approximately 74% of the labor force in the least developed countries was engaged in agriculture, while the share of agriculture in GDP was only 30% (UNCTAD, 2002). The drastically decreasing prices of agricultural crops have resulted in the classifying of these countries into low-income countries (Table 1).

Table 1. Change in price indices of selected primary commodities of the LDCs, 1997-2001

Year	All foods	Cocoa	Coffee	Rice	Sugar	Tea	Wheat	Cotton	Crude petroleum
1997	100	100	100	100	100	100	100	100	100
1998	87	104	82	101	79	104	79	82	68
1999	71	71	64	82	55	97	74	66	95
2000	69	56	48	67	72	104	76	74	147
2001	69	70	34	57	76	83	80	61	127

Source: UNCTAD Secretariat estimates based on UNCTAD Commodity Price Bulletin

Many of those crops generate only small incomes but produce huge amounts of field and process residues, often having a residue ratio of about 90%. Some of these residues make their way to end-usage purposes such

as fodder, fertilizer and energy sources. However, most of them are burned, waste-piled, or disposed of indiscriminately, causing serious environmental problems. Mushroom farming is a potential solution to the excess agricultural waste problems in low-income agricultural countries, as well as being a possible tool in the fight against malnutrition. Mushrooms can be grown on various agricultural wastes and bi-products, including coffee pulp, rice straw, sugarcane bagasse and cotton waste, which are readily available at a moderate cost to farmers in many LDCs. Since mushroom growing does not require a huge land area, small scale farmers or landless people can grow them in a small space such as an underused shed or a pigpen. Mushroom cultivation can begin with only a very small investment. Small mushroom growers can yield higher and quicker returns on their time and monetary investment than those growing other crops (Tables 2 and 3). Though it depends on the species cultivated, most mushrooms can be harvested within 2 to 3 months of planting, which results in small growers generating income from their mushroom cultivation in a very short period of time. Thanks to the potentially quick return, poor farmers with little capital can start mushroom growing with a small loan and often pay it back within several months (Table 3). Thus, mushroom cultivation definitely helps poor farmers produce more income and thereby improve their living conditions.

Table 2. Profitability of maize, wheat, and oyster mushroom production over 4-months duration in Zimbabwe

Maize	Wheat	Oyster Mushroom	
Gross income	1,050,000	2,000,000	2,400,000
Expected yield	3 ton /ha	5 ton /ha	240kg /20m <sup>2</sup>
Average price	350,000/ton	400,000/ton	10,000/kg
Total costs	531,500	860,000	697,000
Labor	60,000	25,000	50,000
Land preparation	26,000	25,000	300,000 (Construction)
Seed	35,000	10,000	180,000 (Spawn)
Fertilizer/Lime	285,000	580,000	15,000 (Antiseptics)
Insecticides	40,500	45,000	120,000 (Straw)
Transport	40,000	55,000	20,000 (Firewood)
Levy	12,000	10,000	12,000 (Plastic bags)
Miscellaneous	33,000	110,000	
Net income (US\$ 629)	518,500 (US\$ 1383)	1,140,000 (US\$ 2067)	1,703,000

\* The figures are in Zimbabwean Dollars. (US\$1=Z\$824)

\* One crop for maize and wheat and two crops for oyster mushroom.

\* Oyster mushroom production area is 20m<sup>2</sup>.

Table 3. Average cost and profit of oyster mushroom production in Nepal (2 month period for 1 crop)

Item	Quantity	Cost in NPR
Straw for 100 packets	300 kg	1200 (USD 16.13)
Plastic bags (18"x26")	100 pcs	400 (USD 5.37)
Spawn (250g/bottle)	50 bottles	1200 (24 per bottle)
Rent	2 months	1000 (500/month)
Chemicals		150 (USD 2.02)
Labour		1200 (USD 16.13)
<b>Total Production Cost</b>		<b>5150 (USD 69.26)</b>
<b>Price</b>	<b>Volume</b>	<b>Total Income Value in NPR</b>
90.00 per kg.	200-300 kg (2-3kg/pack)	18,000-27,000(USD 242.09-363.14)
<b>Net Profit (total income - total production cost)</b>		<b>12,850-21,850 (USD160-270)</b>



Even the recommendation "an environmentally friendly, high income generation from a low investment, simple know-how and a small farming space requirements" does not fully cover all the potential advantages of mushroom farming. Mushroom cultivation also creates a high quality food source with a high medicinal value that could possibly help combat both malnutrition and HIV/AIDS in LDCs. Medical researchers have long studied the medicinal effects of mushrooms including immune stimulation, anti-cancer and anti-viral effects. Mushroom farming can create a substantial income source and, at the same time, an essential nutrient source with high medicinal value.

In recognition of the huge potential of mushroom farming, especially to the LDCs, the MushWorld Foundation was established with the founder's vision of poverty alleviation through mushroom farming. Korea was utterly devastated after the Korean War in 1950 but successfully rebuilt its economy thanks to generous aid from other developed countries and its own hard-working people, achieving the so-called 'Miracle of Han River.' The founder of the MushWorld Foundation has maintained that Korea is to return to poor countries the favor and support itself received from other developed countries in the past. Respecting his vision, the MushWorld Foundation has realized its vision with the close cooperation from Cosmos System (HeineArt Inc., Coznet Inc., and HumanLife Korea Inc.), a group of enterprises that the founder has also led.

## 2 Materials and Methods

### 2.1 Free access to mushroom information

From the perspective that "teach a man how to fish and he will eat for life," the MushWorld Foundation first tried to provide information on how to grow mushrooms for information-poor peoples in less developed countries.

#### 2.1.1 Mushroom information center

To clear the information barrier of those information have-nots, the MushWorld Foundation decided to harness the power of the Internet and launched a web-based mushroom information center, MushWorld (<http://www.MushWorld.com>). With the aid of the Internet, it is now possible to interact with people interested in mushroom growing and to obtain access to a great deal of mushroom cultivation information at any time or from any place.

#### 2.1.2 Image MushWorld

A picture is worth a thousand words. Image MushWorld is designed to help its users to better understand mushroom and mushroom cultivation through the use of images. All the images are searchable by category, title, keyword, and image number. Enlarged images of each thumbnail and image description provide audio/visual information helpful both to beginners and experts. For MushWorld users who need mushroom images for their publication, using copyrighted images were allowed with prior permission. Image MushWorld also provides the possibility for its users to share their images with others, with proper acknowledgement given to contributors.

#### 2.1.3 Mushroom Growers' Handbook

People in LDCs have limited Internet access despite the fact that the Internet is certainly a wonderful tool to disseminate information. To reach out for the more people, the MushWorld Foundation decided to publish a paperback mushroom growing manual. The Mushroom Growers' Handbook is now annually published and distributed to growers, scientists, extension workers and governmental officials in those countries free of charge. The first handbook was on Oyster Mushroom Cultivation. Cultivation of other mushrooms will be explored one

by one in the following issues to come.

### 2.2 Mushroom information hub

Communication and collaboration became more crucial in addressing the specific needs of members when they became more active in asking questions and seeking advice and further information. The MushWorld Foundation decided to create communication tools and opportunities to properly address these needs by linking members in different parts of the world and with varying knowledge of mushroom growing with each other.

#### 2.2.1 Online mushroom communities and world bulletin board

The online community is a gathering place where people with similar interests can communicate and share information and insight with one another. Based on members' requests, a new mushroom community is launched, where community members can post their idea, information, questions and answers to others' question on the message board and library. While the mushroom communities target people with mutual interests, the world bulletin board is designed for people interested in mushroom growing in other countries.

#### 2.2.2 Publication database

Information concerning what topics have been studied and addressed and by whom is often of great interest to researchers who want to discover research and collaboration possibilities. MushWorld provides an online, user-interactive database system for mushroom publications. MushWorld and all of its members put their efforts together to build up the Publication database, where all MushWorld users may find lists of papers and books regarding mushrooms and mushroom cultivation.

#### 2.2.3 Visits to world mushroom industries and conferences

The MushWorld Foundation continues to attend major international meetings in order to obtain the most advanced and newly released research results, and to keep in touch with world mushroom scientists and growers. These meetings and visits generate many beneficial networking opportunities.

### 2.3 Technical and financial support for growers

#### 2.3.1 MushWorld research paper award

In announcing this award, the MushWorld Foundation invited research papers which are expected to be helpful to mushroom growing in the third world countries. Through this opportunity, the MushWorld Foundation hopes to hear from mushroom growers and scientists, especially in these third world countries, and then to be able to financially support their research in the form of prize money, and also assess their additional needs and determine how to support them in encouraging local mushroom growing.

#### 2.3.2 Invitation for hands-on education

The MushWorld Foundation invites several members from developing countries to hands-on education opportunities to advance their knowledge and experience in mushroom growing. For these opportunities, The Foundation selects individuals who have best contributed to the achievement of its mission.

2.3.3 Technical and financial support

At this moment moderate to large-scale mushroom encouragement projects are being carried out throughout the world. In order to secure the successful implementation of these mushroom projects, the MushWorld Foundation actively seeks the best ways to provide the required technical & financial assistance, including recommending mushroom consultants and direct funding mushroom projects.

3 Results and Discussion

3.1 Free access to mushroom information

3.1.1 Mushroom information center

Thanks to the continuous efforts of the MushWorld Foundation and voluntary contributors, MushWorld (www.MushWorld.com), the mushroom information center, has seen more than 27,000 people register as a member as of November 2004. The member demographics by region and occupation are as follows:

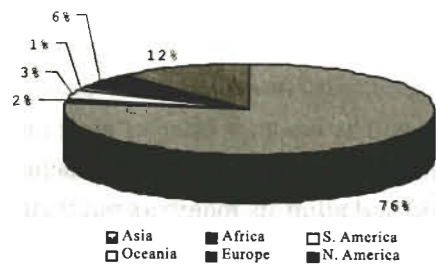


Figure 1. MushWorld members in total by region

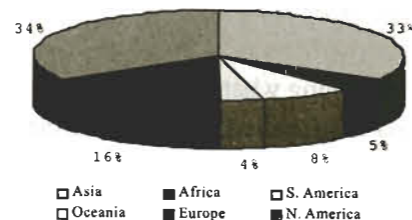


Figure 2. Members of MushWorld (English) by region

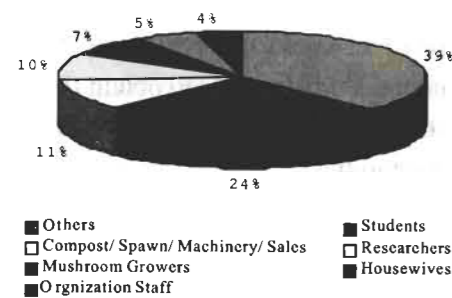


Figure 3. Totals of MushWorld members based on occupation

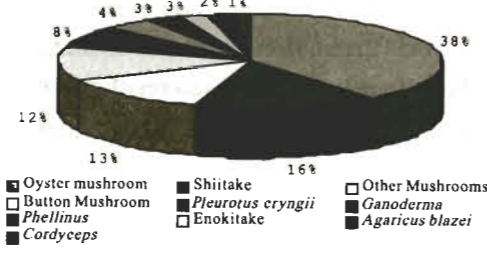


Figure 4. Mushroom growers by mushroom

One noteworthy fact is that MushWorld has at least one member from each of the 176 countries in the world. Thus, MushWorld has an information source reporting in from almost all countries. It has been observed that the more information MushWorld provides, the more professionals willingly contribute their papers to the growing mass. Today MushWorld features some 7,000 articles from 648 authors on a wide range of topics including mushroom cultivation, pests and disease, medicinal mushrooms, and world mushroom industries. Some articles were have been translated into other languages and been distributed to non-English speaking local farmers. Members frequently seek permission for non-profit, educational uses of MushWorld articles.

3.1.2 Image MushWorld

There are innumerable websites featuring the various mushrooms in the world. However, it is declared that

Image MushWorld is the best of its kind worldwide, at least in terms of showing how to grow mushrooms. As of November 2004, images from 30 countries are in service. More and more people obtain their needed visual/ audio information from the website and contribute their valuable pictures to the website. Thanks to this collection of mushroom and mushroom growing images, any MushWorld members and non-members, too, freely and readily discuss mushroom growing with the minimum chance of misunderstanding. Due to lack of MushWorld's announcement or users' knowledge about copyright issues, fewer permissions have been requested for the images' use in other publications than the Foundation expected.

3.1.3 Mushroom Growers' Handbook

This first book was acclaimed as a valuable and helpful information source for mushroom cultivation beginners in less developed countries. To date several thousands of copies of the book have been requested by MushWorld members and other mushroom training-related organizations. Most of the books found their way to African and Asian countries and were also acclaimed as being quite useful and helpful to extension workers. From countries using their own vernacular language, permissions for translation of the book into their own languages such as Thai, Spanish, Arabian and Indonesian were requested. Soon, the Spanish version of the book will be in service for Spanish readers. The MushWorld Foundation can soon open up itself to Spanish speaking world, all thanks to voluntary translators and supervisors. Moreover, the authors who participated in the first handbook expressed their willingness for assistance in the 2<sup>nd</sup> handbook preparation. A steady increase in the number of members was found in the countries where books were distributed. To disseminate the handbook to all members and future growers in advanced countries also, the PDF version of the handbook is also made available.

3.2 Mushroom information hub

3.2.1 Community and world mushroom bulletin board, and mushroom Q & A

To date, MushWorld has witnessed 25 online mushroom communities; 19 in the Korean version of MushWorld and six in the English one. The successful free exchange between members requires Internet literacy plus their willingness to share their own experiences. It is observed that most people prefer direct e-mailing to posting their own messages on the bulletin board, once they found a right person to exchange their ideas with. Despite this kind of member propensity to be less revealed to others, communities and bulletin boards are thought to serve well in creating direct contacts between members. Users have come to know even their own neighbors through MushWorld communities and bulletin boards.

Through online discussion through communities and bulletin boards, MushWorld members, especially Korean members who have lots of issues in common, readily build on their friendship and have chances for regular offline meetings. However, two problematic issues that have been raised are the lack of discussion skills, which leads to frequent arguments, and a lack of Netiquette, which is the form of etiquette practiced or advocated in electronic communication over a computer network.

3.2.2 Publication database

As of November, 2004 some 6,250 titles from 519 sources have been uploaded onto the database. It is almost impossible to see visible results of the Publication Database without direct responses from users. The database is not equipped with a user-tracking feature due to the potential enormous traffic flow, which might impede users' access to information resources. For every newcomer to make a full use of this database, there will be a need to



No	Title	Writer	Date
290	Can I send an article for...	Krishnamoorthy	2004-02-27
297	RE: Can I send an article...	Cristiane	2004-05-12
296	RE: Can I send an article...	srss	2004-02-28
295	black mold contamination	srss	2004-02-27
294	RE: black mold contaminat...	srss	2004-04-05
293	RE: RE: black mold conta...	srss	2004-05-05
292	RE: RE: black mold conta...	srss	2004-04-22
291	RE: RE: RE: black mold...		2004-05-16
290	RE: black mold contaminat...	Ilyphae	2004-03-03
289	RE: RE: black mold conta...	srss	2004-03-04

Figure 5. Mushroom Q &amp; A in MushWorld

more effectively publicize its different functions and features.

Mushroom business and people directories are now in preparation for another “where-to-provider.” This will be developed into a “World Mushroom Map” where all the mushroom growing related data are searchable by location.

### 3.2.3 Visits to world mushroom industries and conferences

MushWorld Foundation’s meetings and visits have included a wide range of people from mushroom scientists to beginning growers and from advanced mushroom giants to developing countries, with visions of suggesting the less-developed countries adaptable skills and creating the real working networks with mushroom professionals. Face-to-face meetings allow for an improved awareness of MushWorld Foundation’s mission and activities, which leads to greater contribution of articles, free consultations for beginning growers and direct one-on-one advice from experts in new user locations.

## 3.3 Technical and financial support for mushroom growers

### 3.3.1 Mushroom research paper award

In 2004, the 1<sup>st</sup> MushWorld Research Paper Award was announced and a score of entries were received. Among them, two entries from the Philippines and Kenya, are to be awarded. The two papers are expected to provide a practical field guide to oyster mushroom growing & shiitake growing in tropical areas. They will serve as what the MushWorld Foundation regards as a model paper for the entries of the next award competitions. Through Mushroom Research Paper Award, the Foundation expects it could support the award participants’ research both financially in the form of prize money and academically in supervising their research process.

After granting the awards, the Foundation will keep the authors engaged as our local correspondents, asking them to keep the MushWorld Foundation updated concerning mushroom growing activities in their own countries and suggest new insights into what the Foundation might further do towards the achievement of its mission. These ideas will serve as a preliminary investigation for project implementations in the future.

### 3.3.2 Invitation for hands-on education

As another first trial for mushroom growing support in less developed countries, the MushWorld Foundation invited three persons from two countries. They had opportunities to attend a mushroom conference, to visit mushroom farms and to stay in and learn from different mushroom farms. They were quite eager to look for differences, advantages and adaptable skills and took photos of every scene.

The MushWorld Foundation found indirectly what they needed in their own countries. So it is now considering giving them training in tropical areas, where participants would get more adaptable skills to follow in their own similar environmental conditions. The necessity of a well-organized curriculum to address the trainees’ needs

and request of their plan and report has been noted.

The MushWorld Foundation is planning several new events to invite education, government, and other relevant agency-recommended persons from less developed countries, who, in return, will train more people in mushroom growing.

### 3.3.3 Technical and financial support

The worldwide MushWorld network has been employed to good effect. For a mushroom project or for troubleshooting, the MushWorld Foundation looked for the right persons to recommend and persuade to give assistance those in need. In a mushroom training project in Nepal, the Foundation could refer those involved in the project to a mushroom professional, whom it came to know from the Mushroom Growers’ Handbook publication. In another technical support requested from the Laotian Embassy, the Foundation chose among MushWorld members and dispatched a mushroom expert to Laos to explore the possibility, feasibility, and necessities in mushroom growing in Laos. The findings from the study will provide Laos with the preliminary knowledge required for implementation of a mushroom project. The MushWorld Foundation is expecting more mushroom professionals and consultants will be dispatched to various other locations according to requests.

Financial support started with funding the aforementioned mushroom project in Nepal, in which girls returned from trafficking were trained in mushroom growing. They are expected to grow mushrooms themselves after training, to sustain their lives and to support their families, successfully returning and contributing to society. The MushWorld Foundation found that substantial and shared involvement is a crucial element in successful implementation of a mushroom project from the case where international humanitarian relief organization, local welfare organization and mushroom experts/trainers all proactively direct their efforts to the successful mushroom project.

## 4 Conclusion

Since its inception, the MushWorld Foundation has tried to turn its vision of poverty alleviation through mushroom farming into reality, largely in three ways, both on and offline. The Foundation maintained a philosophy that in every successful job, human resource factors are always involved. From this perspective, the first two approaches — (1) Free Access to Mushroom Information and (2) Mushroom Information Hub — are believed to be well-adopted, because the information center was effective in attracting mushroom growers and professionals and they were linked to each other through mushroom information hub. Through this MushWorld network, the last approach, (3) Technical and Financial Support for Mushroom Growers is expected to be successfully achieved.

Although the MushWorld Foundation has tried to bridge the information gap between developed and less developed countries through the Mushroom Information Center, it has yet to work on more strategies to promote active participation from MushWorld members and cooperative assistance from mushroom professionals and consultants in order to facilitate the two other recently started and at the moment less effective approaches; the Mushroom Information Hub and Technical and Financial Support for Mushroom Growers. In the meanwhile, a higher rate of participation in the Mushroom Information Hub is expected as improvements are made in Internet access and overcoming language barriers, two common stumbling blocks to the free exchange of opinions among members. African countries, where English is spoken as their official language, witness higher and higher computer and Internet literacy rates, thanks to their own governmental policies putting high priority on computer and Internet literacy and assistance from international organizations. Regarding the language barrier, the MushWorld Foundation is planning to provide mushroom information in a variety of languages. To this end, voluntary translation supports from different language speaking-members are desperately needed. Success in one language came when a group of Argentine members volunteered to translate the Mushroom

Growers Handbook into Spanish. When this dream of being truly multilingual comes true, members who are now passive in sharing their information due to the language barrier are expected to express themselves more actively.

As with the examples of recommendation and dispatch of mushroom experts, poverty-reduction efforts by the MushWorld Foundation will bear fruit with active participation from MushWorld members through the Mushroom Information Hub. Substantial support from willing and experienced mushroom professionals, growers and industries in every corner of the world as a mushroom growing consultant, technician and trainers or a preliminary investigator for a mushroom project, will spur less developed countries' efforts toward poverty alleviation. As a result, the MushWorld Foundation believes, their standards of living will be enhanced at the earliest time possible and the world mushroom community will see an independent, synergistic and mutually beneficial advancement.

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