The Biology of *Lentinus polychrous* Lev. in Nakhon Phanom Province, Thailand and Kwaeng Kham Muan, Laos

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Abstract This article describes the results of the survey on mushrooms in Nakhon Phanom province Thailand and Kwaeng Kam Muan Laos done from April to November 2010. It was found that there were 13 varieties in Nakhon Phanom and 10 varieties in Kwaeng Kam Muan. The 13 varieties in Nakhon Phanom were College of Agriculture and Technology NPU 1 variety, Amphoe Tha U Ten 4 varieties, Kalasin province 1 variety, Amphoe Pla Pak 2 varieties, Tumbon Wangtamua Amphoe Muang 4 varieties and Amphoe Renunakhon 1 variety. In Kwaeng Kam Muan, Laos there were 10 varieties: 2 varieties in Muang Hin Boon, 2 varieties in Muang Tha Khaek, 3 varieties in Muang Yomarat, 1 variety in Muang Mahachai and 2 varieties in Muang Nagai. Each variety was different regarding cap, gills, scales, stalk, color, and size. The caps of these varieties were 4.0 - 14.5 cm in diameter. The caps of some varieties were thick while those of other varieties were thin. The number of gills was about 85-730, and the length of gills was 2.0 - 10.0 cm. The young gills were creamy white in color but the old gills were dark brown. The weight of dry mushroom was 2.0 - 15.0 g. The weight of wet one was 5.0 - 35.0 g. Scales on caps of mushrooms were different in cold season (October - November) and rainy season (April - July). In cold season skin of caps was scabbed and scattered but in rainy season the skin was smooth. Some stalks were short and others were long. Some varieties had short stalks. Average was 1.0 - 2.0 cm. Some varieties had long stalks. Average was 3.0 - 3.5 cm. The colors of caps were mainly brown, but some caps were white-brown and other caps were yellow-brown. When a mushroom is small, it was young about 1 day but when it grew to big size, it was about 2 or 3 days after primordial of mushroom. So Thailand or Laos varieties were similar, also. It meant that it could be preventive against cancer if you eat it always.

Keywords *Lentinus polychrous* Lev., mushroom, cultivation

INTRODUCTION

Hed Bod (*Lentinus polychrous* Lev.) is in family Polyporaceae (Royal Institute of Thailand, 1996). It is blooming on log of trees in natural. It has very good taste. It is a popular mushroom in the north and northeast of Thailand and in Laos (Pukahuta *et al*., 2006). It is called in the local language Hed Kra Dunk, Hed Kon Dum and Hed Lom etc. (Pegler, 1983). In natural Hed Bod bloom in early and late rainy season between March and October which the mushrooms become mature and suitable for studying about taxonomy and could culture the mycelium (Tianhirun, 2002). Nowadays this mushroom had decreased because of the environment change and the destruction of forest (Panmoot, 2002). So it was important to study about the mushroom such as morphology, taxonomy, environment, period of blooming, species of tree log which gave the basic data and conservation of mushroom varieties in order to have advantage and to be guideline villagers could cultivate this mushroom. The digestion of cellulose by mycelium of the mushroom synthesis enzyme lignocellu-

lase such as laccase which could be stored the mycelium for 2 years. So it is confident that productivity and quality of the mushroom could be improved. (Pukahuta *et al*, 2004) which could help people to become rich and have sustainable life.

So in this study, the four objectives were determined. One is to survey and take samples to investigate characteristics of the mushrooms such as diameter of cap, cap width, height, length of stake, length of gill, amount of gill, dry weight, wet weight, color of cap etc. to get basic information of the mushroom. Second objective is to collect varieties of the mushroom for studying and analyzing start from basic information of biology in nature. The third objective is to cultivate the mushrooms on logs of different species of trees to find the best yield and suitable one. Fourth objective is to eliminate poverty by transfering cultivation technology of the mushroom to local villagers.

MATERIALS AND METHODS

Surveyed, photographed and collected the sample of the mushroom that bloomed on log of trees in forest in area of Nakhon Phanom Province, Thailand and Kwaeng Kham Muan, Laos. Took the samples that bloomed in nature on log of trees from villages of Nakhon Phanom and Kwaeng Kam Muan. The number of samples bloomed on logs of trees were not equal in each area because of different environment. Then they were measured and weighed then dried by the sun or wind or the oven in the laboratory and kept in bags. Characteristics in morphology were investigated. Incubated tissue in PDA media, checked growth rate of mycelium and recorded data. All of these surveys were done from April to November 2010 which was in rainy and early cold season.

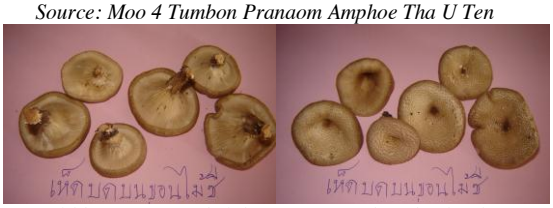
RESULTS AND DISCUSSION

The varieties of Hed Bod were investigated in Nakhon Phanom, Thailand and Kwaeng Kam Muan. Laos have many varieties, 13 varieties in Nakhon Phanom and 10 varieties in Kwaeng Kam Muan. The 13 varieties in Nakhon Phanom were found in College of Agriculture and Technology NPU 1. Amphoe Tha U Ten 4 varieties, Kalasin province 1 variety , Amphoe Pla Pak 2 varieties, Tumbon Wangtamua Amphoe Muang 4 varieties and Amphoe Renunakhon 1 variety. In Kwaeng Kam Muan, Laos there were 10 varieties, 2 varieties in Muang Hin Boon, 2 varieties in Muang Tha Khaek, 3 varieties in Muang Yomarat, 1 variety in Muang Mahachai and 2 varieties in Muang Nagai. There were 23 varieties, all of which were similar in shape and characteristic especially in morphology and period of blooming. All of them bloomed between April and July and between October and November (Leumlum, 2004). The logs of trees that Hed Bod can be grown were *Mangifera indica, Shorea obtusa, Shorea siamensis, Sindora siamensis, Anisoptera costata, Hopea odorata*, *Afzelia xylocarpa* and *Shorea roxburghii* which were found in dipterocarp forest at Amphoe Pla Pak and Amphoe Muang (Punmoot, 2002).

Table 1 Varieties of Hed Bod in Nakhon Phanom, Thailand and Kwaeng Kam Muan, Laos

1. Variety- College of Nakhon Phanom Agriculture and Technology, Nakhon Phanom University *Source: Ban Kam Swang Tumbon Guruku Amphoe Muang*  White-brown cap, white-yellow gill, red gill when mature, cap width 4.5-14.0 cm. height 4.0-14.0 cm. length of gill 1.0-10.0 cm. length of stake 1.0-5.0 cm. thick of cap 3.0 mm. amount of gill 180-730 gills, wet weight 2.0-40.0 g.	2. Variety- Ban Pranom *Source: Moo 1 Tumbon Pranaom Amphoe Tha U Ten*  Cap width 5.5-11.2 cm. height 4.0-9.2 cm. length of stake 3.0 cm. amount of gill 85-300 gills dry weight 2.0-15.0 g. face of cap- white-brown, cap edge was brown, white-gray on central cap, white-red brown gills, length of gill 4.0-9.0 cm.

3. Variety- Ban Pranaom
Source: Moo 4 Tumbon Pranaom Amphoe Tha U Ten



Cap width 5.5-7.5 cm. height 5.0-7.3 cm. length of stake1.0-1.5 cm. length of gill 4.0-7.0 cm. face of cap white-brown, cap edge was light brown, white gills when it was young but had brown gills when it was mature, cap was thickness, cap edge was not broken when it was blooming, dry weight 2.0-5.0 g., amount of gills 184-192 gills

4. Variety Kalasin
Source: Ban Mahachai Tumbon Mahachai , Amphoe Pla Pak

Cap width 6.5-12.0 cm. height 6.0-9.5 cm. cap face was white-brown, on central cap was brown color, length of stake 1.5-3.5 cm. length of gill 5.0-8.5 cm. white-brown gills, cap was thin, cap edge was dark-brown color and broken, wet weight 5.0-12.0 g.

5. Variety Mahachai1
Source: Ban Mahachai Tumbon Mahachai , Amphoe Pla Pak

Yellow-brown cap, central of cap was dark-brown color, cap edge was light-brown, cap width 4.0 cm. height 4.0 cm. dry weight 3.0 g.

6. Variety Mahachai 2
Source: Ban Mahachai Tumbon Mahachai , Amphoe Pla Pak

Cap width 4.7-5.5 cm. height 3.0-4.5 cm. length of stake 1.0-1.5 cm. Cap face was white-brown, Cap edge was dark-brown, amount of gills 86-110 gills, Dry weight was 1.0-2.0 g.

7. Variety- Ban Nong Boa Tumbon Guruku Amphoe Muang

Dark brown cap, cap was thick, white gills, amount of gill 98-106 gills , cap width 6.5 cm. length of stake 1 cm.length of gill 3.5 cm. dry weight was 0.5- 1.0 g. Cap edge was broken, wet weight 5.0 g.

8. Variety- Ban Wangtamua Amphoe Muang

Cap width 9 cm. height 7.0 cm. Central of cap was white-brown. Cap edge was dark-brown. white-redbrown gills, amount of gill 82-100 gills, gill thickness 3.0 mm., length of stake 2 cm., wet weight 7 g.

9. Variety- Ban Nong Sang 1 Tumbon Wangtamua Amphoe Muang

Cap width 8.5-10 cm. height 6.5 cm. dry weight 5-15 g. length of gill 5.5- 6.0 cm. red-brown gills, length of stake 0.5-1.5 cm. Cap face was white-gray. Cap edge was yellow-brown. amount of gill 160-225 gills.

10. Variety- Ban Tan Pak Num Tumbon Chi Bu Ree Amphoe Tha U Ten

Cap width 4.5 cm. height 2.0 cm. length of stake 1 cm. wet weight 2 g. amount of gill 149 gills, cap face was white-brown

11.Variety- Ban Tat Amphoe Tha U Ten

Cap width 2.5-8.5 cm. height 2.3- 6.5 cm. length of stake 1.5 cm. length of gill 2.0-5.2 cm. dry weight 1.0-7.0 g. Cap face was white-gray and yellow.

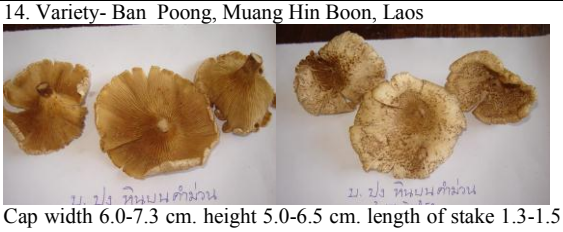
12. Variety- Ban Nong Sang 2 Tumbon Wangtamua Amphoe Muang

Cap width 6.0-8.5 cm. height 6.0 cm. dry weight 2.0-5.0 g. Cap face was white-gray and yellow-brown, brown-gray gills, length of gills 5.0-5.5 cm. amount of gill 167 gills

13. Variety- Ban Phon Tong Amphoe Renunakhon

Cap width 7.2 cm. height 7.5 cm. length of gill 6.5 cm. length of stake 1.5-2.5 cm. Cap face was white-brown, central of cap was yellow-brown, cap was thin, gills color was white-cream, cap edge was light brown, wet weight 2.0- 5.0 g. amount of gill 156-234 gills.

14. Variety- Ban Poong, Muang Hin Boon, Laos



Cap width 6.0-7.3 cm. height 5.0-6.5 cm. length of stake 1.3-1.5 cm. length of gill 3.5-5.0 cm. amount of gill 170-219 gills , wet-weight 4.0-5.0 g. dry weight 0.2-0.5 g. Cap face was white-brown, white brown gills, cap edge was broken.

15. Variety- Ban Wearn Muang Tha Khaek Kwaeng Kam Muan, Laos

Cap width 5.5-6.5 cm. height 4.5-7.5 cm. length of stake 1.5-2.0 cm. white-cream gills, length of gill 4.0-5.0 cm. amount of gill158-328 gills. wet weight 5.0-7.0 g. dry weight 0.5-1.0 g. Cap face was light brown color.

16.Variety- Ban Phon Soong Muang Tha Khaek Kwaeng Kam Muan, Laos

Cap width 6.5-9.0 cm. height 5.5-7.0 cm. length of stake 1.5-2.0 cm. Amount of gill 240-350 gills, length of gill 3.0-5.5 cm. Cap face was white-gray. Cap was thin. Cap edge was broken, dark brown gills, dry weight 5.0-7.0 g.

17. Variety- Ban Phon Dia Muang Tha Khaek Kwaeng Kam Muan, Laos

Cap face was white-gray. Diameter of cap 7.7 cm. length of stake 1.5 cm. length of gill 5.0 cm. cap height 5.0 cm., dark brown gills

18. Variety- Ban Mun Muang Mahachai Kwaeng Kam Muan, Laos

White-yellow gills, cap face was white-gray and brown color, cap width 8.0-11.0 cm. height 6.0-9.3 cm., length of gill 3.5-7.0 cm., amount of gill 112-360 gills, wet weight 5.0 -10 g., dry weight 0.5 g.

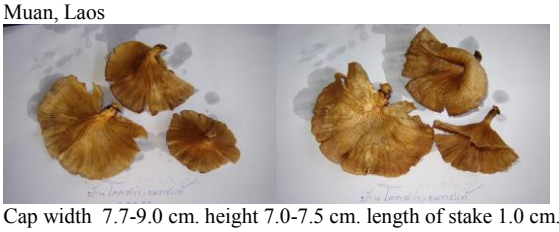
19. Variety- Ban Tha Rung Muang Nagai Kwaeng Kam Muan, Laos

Cap width 7.5-9.2 cm. height 7.3-7.5 cm. length of gill 4.5-7.0 cm. Cap face was white-gray. Cap was thin. Brown gills, length of stake 1.0-2.5 cm. Cap edge was white-gray. Cap deepness 1.0 cm.

20. Variety- Ban North Nagai Muang Nagai Kwaeng Kam Muan, Laos

Cap width 1.7-8.5 cm. height 3.0-8.5 cm. length of stake 0.5-1.0 cm. Cap was thick. Cap face was brown-gray. Central of cap was yellow-brown. brown gills, Length of gill was 2.0-5.5 cm. white brown gills in a young cap but red brown gills in the big size and mature, amount of gill 102-348 gills.

21. Variety- Ban Kog Swang Muang Yomarat Kwaeng Kam Muan, Laos



Cap width 7.7-9.0 cm. height 7.0-7.5 cm. length of stake 1.0 cm. cap was thickness 1 mm. wet weight 8.0-9.0 g. length of gill 4.0-5.0 cm. dry weight 0.2 g. cap face was white and thin, white-brown gills.

22. Variety- Ban Don Du Muang Hin Boon, Kwaeng Kam Muan Laos

Cap face was white-brown. Cap edge was light-brown, white gills, length of stake 1.0-1.5 cm., cap width 2.3-4.5 cm., height 2.0-3.0 cm. amount of gill 172 gills, length of gill 2.0-3.0 cm. wet weight 2.0-5.0 g. Cap was thin and broken.

23. Variety- Ban Yomarat Muang Yomarat Kwaeng Kam Muan, Laos  Cap width 10-11.5 cm. height 7.2-11.0 cm. length of stake 1.0-2.0 cm. Cap face was white-gray. Central of cap was deep and brown color. Dark brown gills, length of gill 6.7-7.0 cm. wet weight 6.0-15.0 g. amount of gill 340-480 gills.	*Totally 23 photos. show the varieties of Hed Bod in Nakhon Phanom, Thailand and Kwaeng Kam Muan, Laos*

Kwaeng Kam Muan, Laos was found same as Nakhon Phanom, Thailand such as at the forest of Ban Tharung Muang Nagai. It was found Hed Poa, Hed Tub Tao or Hed Puearng bloomed at the same time. However, the villagers in both of Mekong River harvest the *Lentinus polychrous* Lev. to be Hed Kra Dung and when you want to cook you will soak it in the water before. Hed Bod could be stored very long time and have rich nutrition. Hed Bod could reduce cholesterol and triglyceride because it has eritadenine substance, which can protect heart disease and high blood pressure disease especially diabetes and HIV (Panmoot, 1994) In addition Hed Bod could induce immuned cells to protect cancer (Sutachit and Sutachit, 2002). Furthermore, Hed Bod could kill cancer cells (Armussa, 2009).

CONCLUSION

Surveying varieties of *Lentinus polychrous* Lev. In Nakhon Phanom, Thailand and Kwaeng Kam Muan, Laos there were many varieties but they had similar characteristics in shape, morphology, and period of blooming. Hed Bod was found on log of trees in dipterocarp forest especially in log of *Mangifera indica, Shorea obtuse, Shorea siamensis, Sindora siamensis, Anisoptera costata, Hopea odorata, Afzelia xylocarpa* and *Shorea roxburghii* was found during April to July and during October to November. The important thing was there were many germplasm of *Lentinus polychrous* Lev.varieties in Nakhon Phanom, Thailand and Kwaeng Kam Muan, Laos. So we can have germplasm resources for cultivation. Furthermore we can use the species of trees that could give high yield and then transfer technology of cultivation to the people

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