1. INTRODUCTION

Fungi play an important role in our everyday life. They are responsible for the decomposition of organic matter (Nebel, 1990). Fungi are the main recycling agents for most of the dead plant materials produced on earth. Without them, logs and plant litter would not become humus and return to the soil; without this composting action of the fungi, the rising heaps of dead plant material would steadily lock away all the earth's nutrients (Arms, 1990;Young, 1994). They are also the cause of plant diseases and many of the diseases of man. Fungi are both destructive and beneficial to agriculture. On the one hand, they damage crops by causing plant diseases, and on the other hand they increase the fertility of soil by inducing various changes in it. Fungi are not solely the concern of the mycologist, but are regarded as very useful tools by researchers in the other scientific fields such as the environmental field, cytology, genetics and biochemistry (Zoberi, 1972).

Only recently, mycologists have started to pay attention to fungi as objects of nature conservation. Data on fungi can provide important additional information for nature conservation. One of the main reasons for paying more attention to the conservation of fungi is the increasing information on drastic changes in the mycoflora in large parts of the world. The methods required to study such changes are outlined. A selection of data is provided on declining species diversity in general and distribution in the forest in particular. Mycology and nature conservation have developed separately for a long time. Mycologists were not interested in conservation aspects of fungi

because they were not aware of possible threats to the mycoflora. On the other hand, because of lack of knowledge in nature conservation (Arnolds, 1990).

Tropical forest is an umbrella term referring to all types of forest in a belt around the equator-the area between Tropic of Cancer and Tropic of Capricorn. Thus, the tropical forests can be divided into two broad categories - evergreen and seasonal forests. Many tropical forest products are vital to today's pharmaceutical industry. An average of one in four of all purchases from drug stores contains compounds derived from tropical forest species. It is essential to preserve this biological diversity. The genetic resources are the common heritage of mankind, and may well prove to be vitally important to the future welfare of the human race because we are in danger by foolishly destroying tropical forest (Sukwong, 1993).

The significance of fungi to the nature motivates people to conserve the fungal species and populations (Arnolds, 1990). The reasons for the fungal nature conservation are the followings. i) Ecological importance: fungi are essential components of biocoenoses by their functions as decomposers of organic matter and pathogens of some forest trees. This is also true for ecosystems of economic value, in particular forests. ii) Value as indicator organisms: fungi can be excellent bioindicator. For instance, one species of the Ganodermataceae is an indicator for the degree of radiation pollution. iii) Economic importance: fungi are important (potential) sources of food and medicines. iv) Importance for science: conservation of the gene pools of fungi is needed in order to extend our understanding of evolutionary processes and the resulting diversity in taxa, morphological structures, and ecological strategies. v) Value for recreation and education: collecting of edible sporocarps of wild fungi is an

important form of healthy recreation in many regions; the study of fungi is a hobby of a growing number of naturalists. vi) Esthetic value: sporocarps of many macrofungi are appreciated by many people as interesting and beautiful components of our environment and as a source of joy and creative activities, for instance photography. vii) Ethical motive: mankind is responsible for the continued existence of the variety of life-forms (including fungi), developed during evolution.

1.1 Description of the study sites

1.1.1 Geography

Doi Suthep-Pui National Park is situated west of Chiang Mai city in northern Thailand, the second largest city, at approximately 18°50' N latitude, 99°0' E longitude. This mountain was declared Doi Suthep-Pui National Park on 14 April 1981 and is under the jurisdiction of the National Parks Division of the Royal Forestry Department. Doi Suthep is 1,610 m above sea level. The National Park includes an area of 261 km^2. The west side of Doi Suthep-Pui National Park has been completely destroyed or severely disturbed, while the other parts of the mountain remain relatively intact (Fig.1).

The National Park includes plants that have spread south from the Himalayas, Yunnan, and Indo-China; while other species, with a basic southern distribution, have come north. The actual kinds of forests that cover Doi Suthep-Pui National Park are not, however, in any way unique or even distinct from similar kinds of forests found in many other places in southeast Asia. The bedrock is almost entirely granitic, while

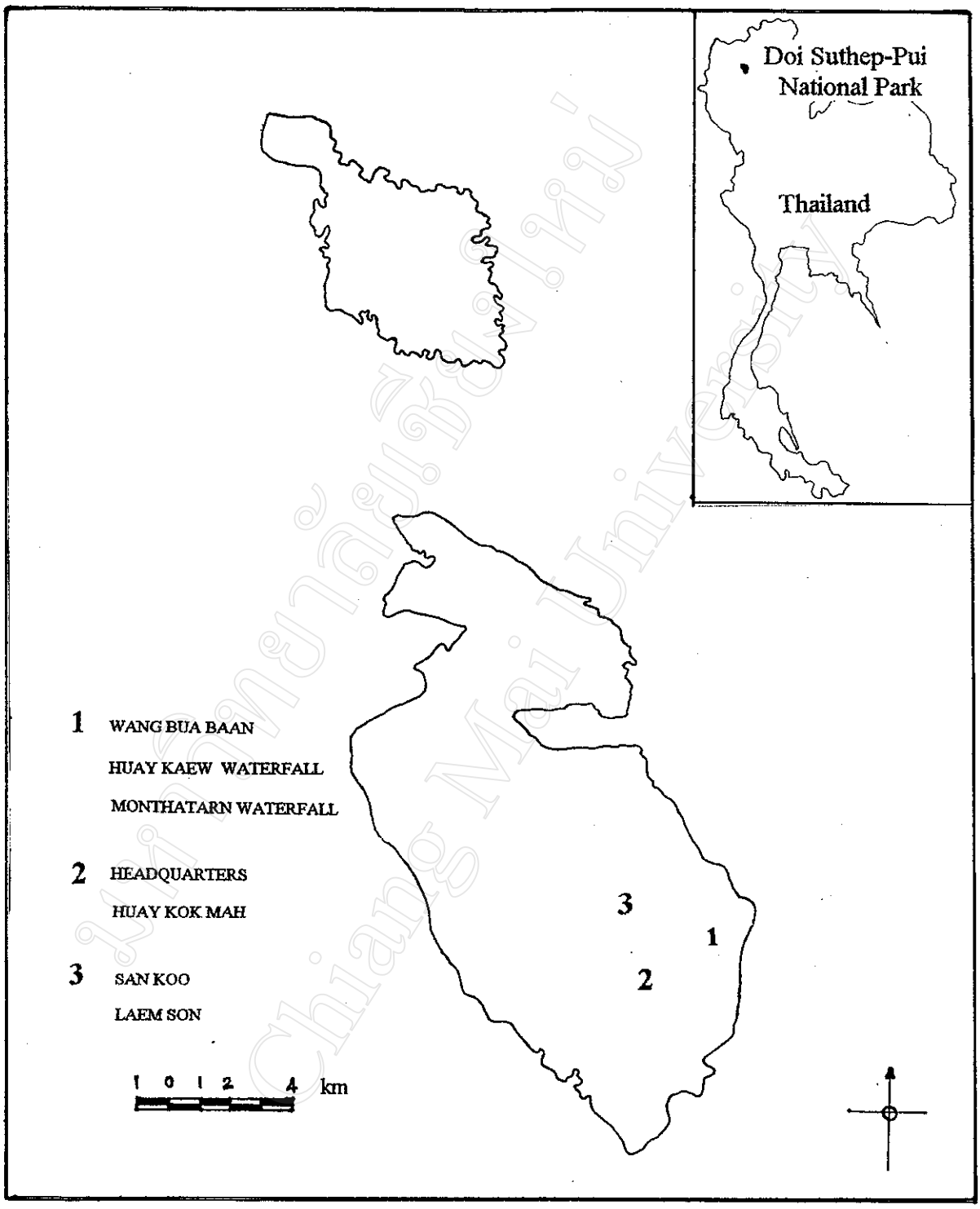

Fig.1 The map of Doi Suthep-Pui National Park and the study sites

shale is found in a few places in the southern part of the National Park. The forest is not influenced by the bedrock here; however, the soil is a major factor in the kind and distribution of the vegetation on the mountain because the soil is generally deep and highly weathered (Elliott *et al.*, 1994), sandy loams or sandy clay loams (Davis *et al.*, 1995).

The annual rainfall ranges from about 1,000 mm per annum at the base of the mountain to about 2,000 mm near the summit. There is a marked dry season from December to March, during which virtually no rain falls. The rainy season extends from May to November, with peak rainfall in August (about 250 mm). The cool season is from November to February, when the mean temperatures at the base of the mountain are 20-24 °C, after which the mean temperatures rise sharply in April to 30 °C. The climate at higher elevations are considerably cooler (Davis *et al.*, 1995).

1.1.2 Vegetation

There are two basic kinds of forest in the National Park : deciduous and evergreen forests.

(1) Deciduous Forest

The deciduous forests are found from the base of the mountain at 350 m elevation to between 850-950 m elevation. There are two deciduous vegetational associations, which tend to merge together without any clear boundaries.

(1.1) Deciduous Dipterocarp-Oak Association

The deciduous dipterocarp-oak (savanna) association of the lower levels of the mountain belongs to the Dipterocarpaceae and Fagaceae Families occurring in the drier areas, especially on ridges (Davis *et al.*, 1995). From about December until May or

June, almost all of the woody plants are leafless and the ground flora are dry and frequently burnt. The trees are of similar height and generally well spaced forming a single-storied canopy, and have thick, charred bark. The largest trees (up to about 15 m high) are *Dipterocarpus obtusifolius* Teijsm. ex Miq. var. *obtusifolius* and *D. tuberculatus* Roxb. var. *tuberculatus*. The main canopy is dominated by *Shorea siamensis* Miq. var. *siamensis*, *S. roxburghii* G. Don (all Dipterocarpaceae); *Quercus kerrii* Craib var. *kerrii*, *Q. kingiana* Craib, and *Q. aliena* Bl. (all Fagaceae). They are mixed with the other common trees (Maxwell, 1988; Davis *et al.*, 1995).

The understorey in this kind of forest consists of many species of shrubs and perennial herbs with tubers or rhizomes that tolerate the frequent, often annual burning, of the dry ground flora. The most conspicuous and abundant ground herbs are members of the Zingiberaceae (ginger family), members of the Orchidaceae, grasses and sedges.

(1.2) "Mixed" Deciduous Association

The deciduous dipterocarp-oak association tends to merge with what is often referred to as the "mixed" deciduous forest (43% of the individual trees are evergreen) where the dipterocarps and oaks are phased out by taller, and often less fire-resistant, deciduous trees. The understorey is denser and the ground is covered with more herbs than in the deciduous dipterocarp-oak zones.

In general, the "mixed" deciduous forest vegetation is found in the moisture gullies between the lower deciduous dipterocarp-oak areas and the primary evergreen forested areas which start from 850-950 m elevation. There is usually a much less distinct demarcation between the "mixed" deciduous and evergreen forests than

between the deciduous dipterocarp-oak and "mixed" deciduous areas (Maxwell, 1988). No families or species dominate this forest type (Davis *et al.*, 1995).

(2) Primary Evergreen Forest

From about 950 m elevation to the summits of Doi Suthep and Doi Pui, most of the vegetation is primary and evergreen. Indeed, the area about Doi Suthep temple and the National Park Headquarters nearby, as well as the entire Chang Kian Valley at the elevations above 950 m, includes the most pristine, dense, and diversified vegetation on the entire mountain.

The canopy, some 35-50 m high, is composed of some species of Euphorbiaceae, Dipterocarpaceae, Magnoliaceae, Meliaceae and several oaks (Fagaceae), e.g. *Castanopsis indica* (Roxb.) A. DC., *C. acuminatissima* (Bl.) A. DC., *C. tribuloides* (Sm,) A. DC., *Quercus incana* Roxb., etc. The shrub and treelet flora are typically dense and consist of many more species of similar habit than those found in the deciduous forests. The primary evergreen forest in many areas, undoubtedly due to centuries of disturbance, gradually becomes less dense and with a shorter canopy from about 1,450 m elevation to the summits of Doi Suthep and Doi Pui. There is a significant increase in evergreen oaks (Fagaceae), e.g. *Quercus lanata* Sm., *Castanopsis acuminatissima* (Bl.) A. DC., *C. armata* (Roxb.) Spach, along with old plantations of *Pinus kesiya* Roy. ex Gark. (Pinaceae), which is a native species. The actual summits of Doi Suthep and Doi Pui consist of single-storied, mostly evergreen trees with a dense epiphytic flora and diverse ground flora which lack lianas and bamboos. The trees from about 1,500 m elevation are covered with numerous species of epiphytic orchids (Maxwell, 1988).

1.2 The purposes of study

The purposes of the study were to examine the species richness, abundance, distribution and microhabitat of macrofungi in the Family Ganodermataceae on Doi Suthep-Pui National Park and the vicinity, Chiang Mai Province. Then the distribution map of these macrofungi in the study sites was constructed.