หางเลือกเพื่อเพิ่มรายได้ และอนุรักษ์ป่าไม้ไผ่ ในภาคเหนือ ของประเทศไทย

Bamboo Caterpillars: An Alternative Income Generation Resource and Conservation of Bamboo Forests in Northern Parts of Thailand

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ทางเลือกเพื่อเพิ่มรายได้และอนุรักษ์ป่าไม้ไผ่ในภาคเหนือของประเทศไทย

บทคัดย่อ

หนอนเยื่อไม้ไผ่ Omphisa fuscidentalis หรือ "หนอนรถด่วน" เป็นตัวอ่อนของผีเสื้อกลางคืนอาศัยอยู่ในต้นไผ่ 3 สายพันธุ์ ได้แก่ ไผ่หก (Dendrocalamus hamiltoii) ไผ่ซาง (D. strictus) และ Thysastachys siamensis ซึ่งปัจจุบันกำลังประสบปัญหาการลดจำนวนลงตามปริมาณป่าไผ่ และหนอนเยื่อไม้ไผ่เป็นรายได้หลักของกลุ่มชาติพันธุ์ในเขตภาคเหนือตอนบน การวิจัยครั้งนี้เป็นการถ่ายทอดเทคโนโลยีการเลี้ยงและเฝ้าสังเกตการเจริญเติบโตของหนอนเยื่อไม้ไผ่ให้แก่เกษตรกรกลุ่มชาติพันธุ์ ที่อยู่บนดอยตุงและดอยแม่สลอง จำนวน 206 คน ครูจำนวน 18 คน และเจ้าหน้าที่สำนักงานเกษตรกรจังหวัดเชียงราย จำนวน 7 คน ผลที่ได้จากการวิจัย ทำให้ร้อยละ 60 ของเกษตรกรมีรายได้มากกว่า 5,000 บาท ร้อยละ 37 มีรายได้ประมาณ 10,000 บาท และร้อยละ 3 มีรายได้มากกว่า 50,000 บาทต่อปีในการขายหนอนเยื่อไม้ไผ่ ผลกระทบจากโครงการทำให้เกษตรกรบนดอยตุงและดอยแม่สลองหยุดขุดหน่อไม้ และไผ่ที่ยังไม่เจริญเติบโตเต็มที่ขาย อีกทั้งเกษตรกรบนดอยแม่สลองปลูกต้นไผ่ เพิ่มจำนวน 300,000 ต้น เพื่อเลี้ยงหนอนรถด่วนสร้างรายได้

โดยภาพรวมหนอนเยื่อไม้ไผ่อาจเป็นกุญแจสำคัญประการหนึ่ง ในการช่วยอนุรักษ์ป่าไม้ไผ่และบรรเทาปัญหาความยากจนในประเทศไทยได้

คำสำคัญ:

หนอนเยื่อไม้ไผ่ เทคโนโลยีการเพาะเลี้ยง การอนุรักษ์ป่าไผ่

Abstract

Bamboo caterpillars, Omphisa fuscidentalis, are found in culms of three species of bamboo; Dendrocalamus hamiltonii, D. strictus and Thysastachys siamensis. The main objective was to transfer bamboo caterpillar rearing technology to villagers of Doi Tung and Doi Mae Salong to enhance income generation and conservation of forests. Bamboo caterpillars rearing technology was transferred to 206 villagers including 18 school teachers and 7 agricultural staffs.The results showed that 60% of villagers had more income than 5,000 bahts, 37% around 10,000 bahts and 3% more than 50,000 bahts per year. After pursuing bamboo caterpillar rearing training, villagers stopped collecting young bamboo shoots and planted more than 300,000 bamboo seedling for rearing bamboo caterpillars. In conclusion, bamboo caterpillars could play a key role in poverty alleviation and conservation of bamboo forests in northern Thailand.

Key words:

Bamboo caterpillars, rearing technology, bamboo forest conservation, poverty alleviation

Introduction

Human consumption of insects is common throughout the world. It is estimated that 2,000 insect species are consumed around the World. **Food and Agriculture Organization** (2004) reported that caterpillars of many species are rich in potassium, calcium, magnesium, zinc, and iron, as well as B-vitamins. FAO has also stated that "edible insects from forests are an important source of protein and unlike those from agricultural lands, they are free of pesticides". Edible insects will be an alternative source of income for poverty alleviation. Eating insects within ethnic groups of Thai society is a traditional culture, which has been practiced since a long time ago in the northern and northeastern parts of Thailand. Insects are sources of protein for farmers in Thailand **(Somnasang,**

et al.,1984). In Thailand, more than 308 types of edible insects belong to 5 orders, 9 families and 16 species eat (Chansang et al. 2542). Bamboo caterpillar, one of the most delicious caterpillars, is a main source of protein for many deprived communities, however, is delicious for high socioeconomic groups (Jordon, 1993; Chen et al.,1998).

Bamboo caterpillar, Omphisa fuscidentalis, belongs to Pyralidae, is a tropical snout moth found in bamboo forests of Bangladesh, Bhutan, Cambodia, China, India, Laos, Myanmar, Nepal, Thailand, Vietnam (Thapa, 2009). Male and female moths are dried bamboo sheet straw-yellow. The upper-side of a male moth is light straw-yellow with blackish patches and dark zigzag lines with two black spots. The under-side is light yellow. The upper-side of a female is straw pale yellow-brown with blackish patches and zigzag lines on forewings. The under-side is pale yellow. The body length of males was 19.2 ± 0.3 mm long and females was 22.5 ± 0.3 mm. The fore wingspan of males was 37.7 ± 0.4 mm long and females was 41.4.0 ± 1.0 mm. Female moths survived 3.7 ± 0.2 days and male 3.8 ± 0.2 days at 24.7 ± 0.2°C with 83.3 ± 1.2% of RH in the laboratory. Females lay eggs in clusters from 30 to 195 at the base of young bamboo shoots. The eggs are flat and overlap like fish scales. The length of eggs is 8.8 ± 0.2µm and 6.9 ± 0.1µm wide. The mature caterpillars are 31.82 ± 2.30 mm long. Bamboo caterpillars hatch within 5-6 days after laying of the eggs on young bamboo shoots. After hatching, caterpillars make a tiny hole and enter into the young bamboo shoot. The newly hatched caterpillars have distinct orange brown head with well developed mandibles. The head bears short antennae and six ocelli. These caterpillars have three pairs of articulated legs on the thorax and five pairs of fleshy prolegs on the abdomen and one pair on the last abdominal segment. Each leg bears a single claw, which help them to move up and down on culms. These caterpillars are seldom hairy and milky white. They mold four to six times before entering pupal stage (Thapa, 2010). The newly hatched caterpillars feed on inner pulp of the young bamboo shoot. The matured caterpillars enter diapause in September and pupae in June in the same internode (Singtripop et al., 1999). The caterpillars stage lasts from 280-300 days in culms. Male

pupae are 22.6 + 0.1 mm long and 5.2 + 0.0 mm in diameter and female pupae 24.4 ± 0.1 mm long and 5.5 ± 0.0 mm in diameter. The male pupae are shorter than female pupae. The average weight of male pupae is 0.3 ± 0.0 g and females 0.4 ± 0.0 g.The male pupae are lighter than female pupae.The pupae are light yellowish-brown in the first three weeks, and turn dark black before emerge. The pupal abdomen consists of 10 segments and the last segment is equipped with cremaster (eight clusters of small hooks). The pupae are hung upside down in clusters of 90-214 individuals from the node of bamboo during May-August. The pupal stage lasts for 35 days at 24.7 ± 0.2°C with 83.3 ± 1.2% of RH in the laboratory (**Thapa, 2010**).

Seven ethnic groups namely Akha (48%), Lahu (16%), Tai Yai (17%), Chinese (9%), Lua (5%), Thai (2%), and Lisu (<1%) live in mountainous areas of northern Thailand, are under the poverty level (**Maxwell, 2007**). They do not have any extra sources of income except hunting wild animals, edible insects and edible plants. Ninety nine percentages of young bamboo shoots were harvested and sold at the cost of 2-3 baht per kg during the rainy season. After that, they have to depend on forest byproducts. Bamboo caterpillars, a forest byproduct, are demanded around 2,000-3,000 kg (equivalent to 400,000-600,000 bahts) per month in the local and international markets. However, bamboo caterpillars are harvested in a traditional way by randomly cutting bamboos. In this way, the villagers destroyed bamboos. The destruction of bamboo forests in northern Thailand would not only destroy bamboo forests, sinks of hundreds of tons of carbon-dioxide from the atmosphere, but also would lead to depletion of bamboo forests. Therefore, conservation of bamboo forests is urgently needed. Before initiating this project in Doi Tung and Doi Mae Salong, villagers had generated less than 1,000 bahts per month by selling bamboo caterpillars. The main objectives of this research were to transfer the mass rearing of bamboo caterpillar technology for income generation and conserve bamboo forests in northern forests of Thailand.

Materials and Methods

Study sites

Field experiments were done in Doi Tung, Samakkee Kao village, Mae Fah Luang district (elevation 876 m, 20° 17′24.8″ N latitude, 99° 48′39.6″ E longitude). The climate in Doi Tung has three distinct seasons. The cool-dry season is from November-February which is followed by a hot-dry period from March to May. The rainy season begins in May-June and ends in November. Climatic data, provided by the Doi Tung Development Project, has been recorded at 3 stations located at 550, 570, and 1200 m elevation. There is a distinct dry season from December to March during which there is little to no rain. The first rains are experienced in April, but it is not until May that there is any regularity in rainfall. The highest amount of rainfall is during July-September. The average annual rainfall at 550 m is 1925 mm, 2100 mm at 750 m, and 2500 mm at 1200 m shows the average monthly amounts of rainfall at all three elevations. Temperatures are lowest from November to February with an average minimum at 500 m of 13°C in January-February and 21°C from June-August. At 750 m the lowest average temperature is 13°C in December and the highest is in April with 31°C. At 1200 m, the temperatures are lower with November-January having average temperatures at 13°C and a peak in April of 23°C.

Selection of villagers

The villagers were interviewed and questioned about their interest in income generating activities. After the interview, the villagers were selected and trained on an artificial rearing technique of bamboo caterpillars.

Selection of bamboo species

Three species of bamboo Dendrocalamus halmiltonii, and D. strictus and Thysastachys siamensis were used to rear bamboo caterpillars. Ninety percentage of bamboos species; D. halmiltonii, and D. strictus were used to

rear bamboo caterpillars in this study.

Bamboo worm rearing technology transformation

More than 206 villagers were trained by organizing one day bamboo caterpillars rearing training at the Border schools, Doi Mae Salong and Mae Fah Luang University, Chiang Rai. During the training times, the participants were taught morphology, biology, life cycle, harvesting and packaging methods of bamboo caterpillars. The participants also practiced "how to release moths on young bamboo shoots by caging methods" and "hung the pupae method" in bamboo forests.

Results and Discussion

Participation of villagers

The bamboo caterpillar rearing trainings were participated by high number of males (78.2%) compared to females (21.7%) (Figure 1). The participant age was ranged from 14-65 years old.

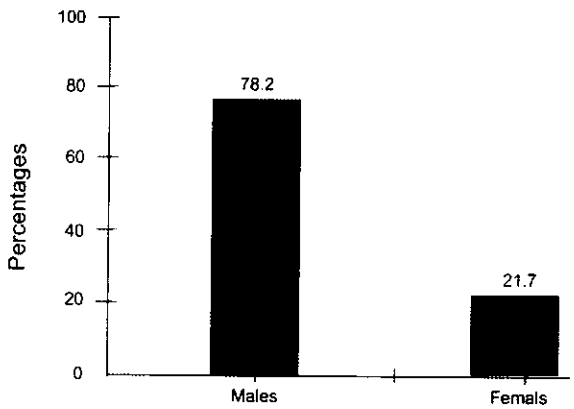

Figure 1. Responses of villagers

Villagers's response

Questionnaire surveys to know the villagers interested were conducted in Doi Tung and Doi Mae Salong. In total 86 individuals were responded. Seventy-six percentage were responded questionnaire surveys, but 23.4

percentage did not respond probably due to illiteracy (Figure 2).

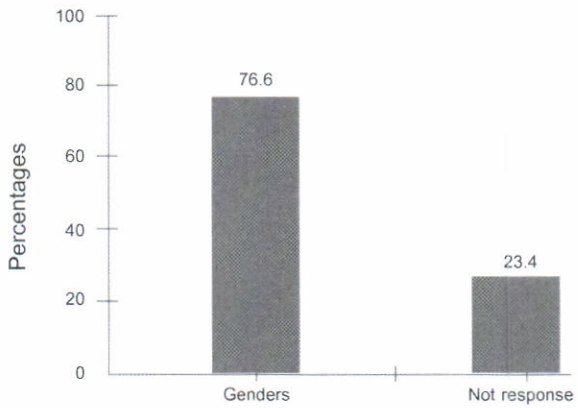

Figure 2. Villagers' responses

Villagers's interest

The villagers were asked their opinion on three main income generation activities; vermiculture, bamboo caterpillars and beekeeping. Forty percentages of villagers were interested in vermiculture followed by bamboo caterpillars (32%) and beekeeping (28%) (Figure 3).

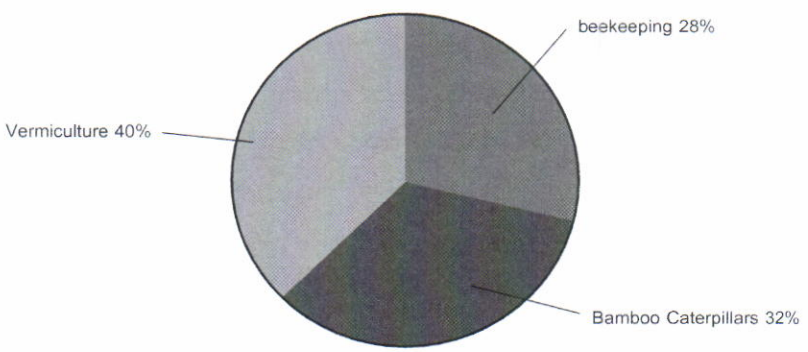

Figure 3. Comparison of villagers interested in income generation activities

Technology transfers to villagers

In total 206 villagers including 18 school teachers and 7 agricultural staffs were trained in Doi Tung, Doi Mae Salong, and Mae Fah Luang University, Chiang Rai (Figure 4). The school teachers did not practice bamboo caterpillars in their schools due to lack of bamboo species. Subsequently, agricultural

staffs also did not practice.

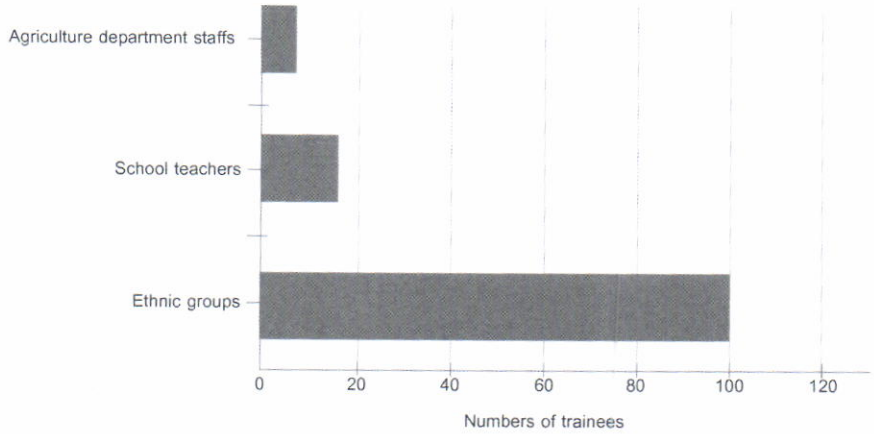

Figure 4. Number of participants in bamboo caterpillars rearing training.

Number of trainees

Twenty-five out of 206 (12.1%) villagers were reared bamboo caterpillars. Seventeen (68%) were in Doi Tung and 8 (32%) were in Doi Mae Salong. The numbers of villagers participated bamboo caterpillar rearing training in Doi Mae Salong were higher (66.8%) than Doi Tung (7.5%). But the number of bamboo caterpillar rearers were lower (3.5%) in Doi Mae Salong compared to (7.5%) Doi Tung (Figure 5). It is because, the bamboo species, which bamboo caterpillars eat, were not presented in Doi Mae Salong.

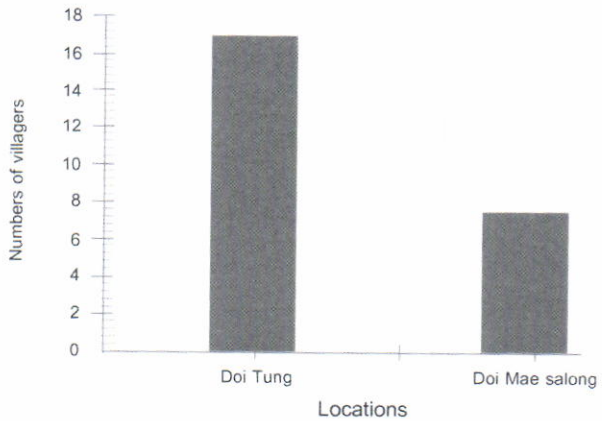

Figure 5. Numbers of villagers rearing bamboo caterpillars in Doi Tung and Doi Mae Salong

Bamboo caterpillar rearing technology transfer

Akha villagers started to share their experiences among other hill tribe people in Doi Mae Salong and Doi Tung. Two Akha trainees were further training their ethnic groups in their own language in Doi Tung and Doi Mae Salong.

Harvesting techniques of bamboo caterpillars

Twenty five percents of trainees were harvested bamboo caterpillars from their bamboo forests. They sold bamboo caterpillars at 350 baht kg in the local markets. Monthly 2,000 kg of bamboo caterpillars are demanded, which cannot be fulfilled by Doi Tung villagers.

Income generation

Sixty percentages of villagers had income more than 5,000 bahts, 37% had around 10,000 bahts and 3% had more than 50,000 bahts per year by selling bamboo caterpillars (Figure 6). Therefore, bamboo caterpillars are a key species in poverty alleviation in northern parts of Thailand.

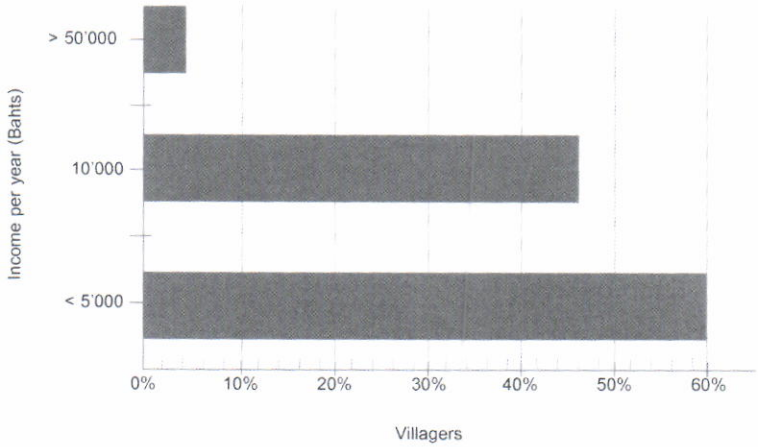

Figure 6. Income generation by selling bamboo worms

Commercialization of bamboo caterpillars

Around 17 villagers in Doi Tung have already started to rear bamboo caterpillars in 900 Rai in Doi Tung, Mae Fah Luang, Chiang Rai since 2552.

Documentary films

Thai Channel 5, 7 and 9 had documented biology and harvesting method of bamboo caterpillars to awareness of edible insect role in poverty alleviation and conservation of bamboo forests.

Conclusions

After initiating bamboo caterpillars rearing technology, incomes of villagers have been enhanced from 5,000 to 50,000 bahts per year by selling bamboo caterpillars. Harvesting of young bamboo shoots has been stopped. As a consequence, bamboos have restarted to grow in Doi Tung and Doi Mae Salong. Now, 900 Rai in Doi Tung have been used to rear bamboo caterpillars in Doi Tung.

Bamboo caterpillars rearing technology is very simple and does not require high technology and equipment. Therefore, villagers can rear bamboo caterpillars using locally available materials.. So, the villagers can learn and transfer the technology to other villagers simply by demonstrating rearing technology. Therefore, this mass rearing of bamboo caterpillar technology should be disseminated to other villages to eliminate poverty and to regenerate bamboo forest for carbon sink.

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