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Conservation and management of rare fern allies of *Huperzia phlegmaria* (L.) Rothm

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Report

Above 3.4% of the predicted total number of species on Earth is plants. Now, estimated that between 22 and 47% of the world's flora is in serious decline. Over 8,000 plant species worldwide are threatened with extinction, according to the World Conservation Union, and that number grows daily. Plants and their communities are an indispensable part of the Earth's biosphere as plants not only affect ecosystem functioning, but also provide essential ecosystem services for the benefit of human being. Many factors are contributing to the loss of plant species, and these threats act synergistically. Foremost among the causes of extinction is conversion or destruction of habitats by humans. Over harvesting of wild plants species are used for food and medicine. These plant species were going to endangers categories. Reintroduction or creation of new populations of plants are another conservation tool that follows on seed banking, but this practice carries its own challenges. Many reintroduction efforts fail because the species' ecology is poorly understood or because their original habitat has been irrevocably damaged. It is risky to existing populations to remove and deplete their seeds in favor of establishing new populations. It is not enough to scatter seeds in apparently appropriate habitat and hope for the best. Seedlings are monitored closely for survival and reproduction, and reasons for plant mortality must be carefully observed.

The genus of *Huperzia* has a cosmopolitan distribution, *ca.* 400 species found in throughout the world. *Huperzia* species been used for traditional Chinese medicine to treat fever, blood loss and irregular menstruation (Kozikowski and Tückmantel,2000). The active constituent of huperzine-A, an alkaloid isolated from *Huperzia* species that prevent the breakdown of acetylcholine. The loss of acetylcholine function is a characteristic of several disorders of brain function, huperzine-A is believed to be effective in stopping the spread of Alzheimer's disease. The active constituents of Huperzine was protect brain tissue, and increasing its potential for helping reduce symptoms of brain disorders and increasing memory of brain (Cheng and Tang,1998; Wang *et al*.,1999; Ved *et al*.,1997; Skolnick,1997).

Fig.1: Habitat of *Huperzia phlegmaria* (L.) Rothm

The field work was conducted in the during the periods January 2011 – February 2013 KMTR, Western Ghats regions, Tamil Nadu. The visually observed in *Huperzia phlegmaria* was identified by senior author. The macroscopic and microscopic characters were studied by live specimen collected from Upper Kodaiyar, Western Ghats, Tamil Nadu. The fern allies of *Huperzia* species was reproduction by both method of sexual and asexual method. Spores are sexual propagules, but they are usually inactive, complicated and germination takes several years. The *Huperzia* species was multiplication of vegetative propagation method through stem, leaf, root, rhizomes or other cuttings is a better option. Earlier studies many commercial horticultural plants successfully established through the vegetative method (Hartmann *et al*., 1990). The Microscopic observation of spore of *H. phlegmaria* are triangular to sub-triangular in outline, trilete in nature with sides straight to somewhat concave margins. Distal spore surface shows foveolate ornamentation while proximal surfaces are unornamented.

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Fig.2: Spore bank of *Huperzia phlegmaria* (L.) Rothm

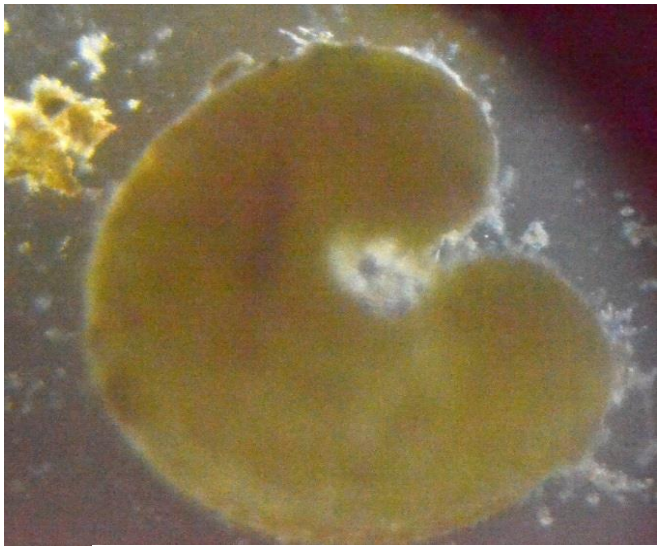

Fig.3: Microscopic observation of sporangium of *H. phlegmaria* (L.) Rothm

Fig.4: Microscopic observation of spores of *H. phlegmaria* (L.) Rothm

Fig. 5: Regeneration of *H. phlegmaria* (L.) Rothm through micophylls

Fern allies of *Huperzia phlegmaria* (L.) Rothm were collected from theni forest region of Western Ghats, Tamil Nadu. Habit of *Huperzia phlegmaria* is unique structure of body, and overlapping sporangia to form in cones at the end of branches and simplicity in foliage morphology, but with equal ancient novelties. *Huperzia* species are very slow growing plants, and germination of a spore could be take 15 years to develop into a gametophyte (Benzing, 2012; Cobb, 1963). Life cycle of *Huperzia* species is very long duration. This factor is one of the reason for decline of their population and another reason of *Huperzia* species are harvested for decorative purposes and medicinal uses. Harvesting for greens is different for this plant in that the entire aboveground runner, or rhizome, is yanked from the surface of the soil; hence, the entire plant or section of a clone is harvested, rather than just the mature aerial stems as done for the ground pines. Optimal lateral extension or growth for each rhizome has been recorded to occur in year 1 (most recent year growing tip) to year 6, with maximum extension reaching 400 to 600cm. Greatest aerial stem mass was recorded in years 3 to 6, with peak weights reaching 13 to 25 grams (Nauertz and Zasada,2015). The conclusion of the present study observed that *Huperzia phlegmaria* can be successfully propagated through bulbil methods of natural condition (Fig.5). With further research is going on large scale production, *Hupezia* species in tissue culture method and develop standard media for the mass propagation protocol.

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