

## **FINAL REPORT OF THE PROJECT**

# **“Pollinators, People & Biodiversity: Ensuring Food Security & Diversity with Indigenous Hill Communities in the Nilgiris Biosphere Reserve, Southern India”**

**November 2008 – November 2009**

### The Objective

Secure agro biodiversity and food security through indigenous pollinators and Habitat reconstruction Approaches

### Planned activities

- Revive traditional mixed agriculture with need based tribal families using native pollinators in active manner.
- Revive the practice of Mannukaran the village agriculture resource person who has traditional knowledge of the fertility of the soil, diseases and pest management, weather conditions, fore casting, selection of seed.
- Set up community seed banks and establish a local network of seeds exchange and campaign for the diversity, local foods and promotion of overall agro bio diversity.
- Disseminate through posters and other media tools and approaches the importance of pollinators in organic, holistic farming.
- Establish between plants-pollinators-people and prepare materials for spreading the message
- Design an appropriate soil testing unit for mapping soil profiles and the impact of millet cultivation on the steep slopes.
- Set up small experiment to establish the linkages of bee or other native pollination systems for the select economically and culturally useful plants(lime, tree, coffee, bean, tamarind and niger)Plan and implement farmer trainings and farmer-farmer contacts and interaction within and outside region India/south East Asia)
- Network with the international NTFP-Exchange Program [www.ntfp.org](http://www.ntfp.org) to use result and understand the process from this initiative for application and introduction to South & South Asian region

**Revive traditional mixed agriculture with need based tribal families using native pollinators in active manner.**

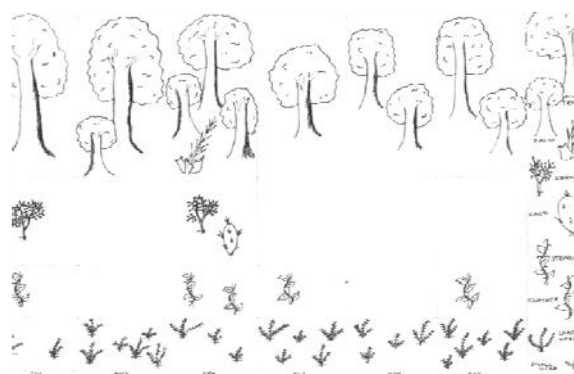
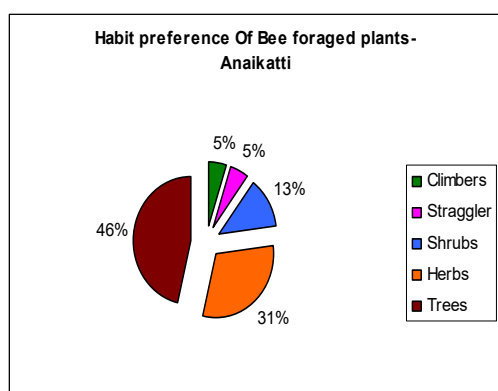
**List of participating Farmers, kinds of crops and land extend for Pollination study and Documentation:**

| S.No | Name of the Region / Village | Name of Farmer          | Kinds of crops cultivated and observation of Indigenous pollinators | Extend       |
|------|------------------------------|-------------------------|---|--------------|
| 1    | Arakode                      | V. Sivaraj- Samaigudar  | Millet and coffee   | 1 acre       |
| 2    |                              | R.Mani “                | Millet and Coffee   | 1 acre       |
| 3    |                              | MGujjan -Bangalapadigai | Vegetable and Coffee  | 1 acre       |
| 4    |                              | M.Najan-Bangalapadigai  | Vegetable and Coffee  | 1 acre1 acre |
| 5    |                              | N.Palani- Karikaiyur    | Millet  | 1 acre       |
| 6    |                              | Masanan-Koapiyur        | Millet  | 1 acre       |
| 7    |                              | L.Kuttiyan-Gudagur      | Millet and coffee   | 1 acre       |
| 8    |                              | B.Rengan-Kokode         | Millet and coffee   | 1 acre       |
| 9    | Konavakarai                  | Rasu –Semanarai         | Millet  | 1 acre       |
| 10   |                              | Rengasamy-              | Millet  | 50 cents     |
| 11   |                              | Natraj                  | Millet  | 50 cents     |
| 12   |                              | Mani                    | Millet  | 1 acre       |
| 13   |                              | Marai                   | Millet  | 1 acre       |
| 14   |                              | Kari Murugan            | Millet  | 50 cents     |
| 15   |                              | Mahalingan              | Millet  | 50 cents     |
| 16   |                              | Ari –Kolithorai         | Vegetable   | 50 cents     |
| 17   |                              | Kannan-Banangudi        | Millet  | 1 acre       |
| 18   |                              | Selvaraj- Banangudi     | Millet  | 1 acre       |
| 19   |                              | Kumar –Banangudi        | Millet  | 1 acre       |
| 20   |                              | T.K.Johee – Banangudi   | Millet  | 1 acre       |
| 21   |                              | T.Rengan- Banangudi     | Millet  | 1 acre       |
| 22   |                              | Aari-Baviyur            | Vegetable   | 1 acre       |
| 23   |                              | Janaki-Vellaricombai    | Coffee  | 1 acre       |
| 24   | Melseemai                    | J.Sivakumar             | Vegetable and Millets   | 50cents      |
| 25   |                              | R.Bettan                | Vegetable and Millets   | 1 acre       |
| 26   |                              | K.Karupanraj            | Vegetable and Millets   | 1 acre       |
| 27   |                              | Thangavel               | Vegetable and Millets   | 1 acre       |
| 28   |                              | Marimuthu               | Vegetable and Millets   | 2 acres      |
| 29   |                              | Madavan                 | Vegetable and Millets   | 1 acre       |
| 30   |                              | Moorthy                 | Vegetable and Millets   | 1 acre       |
| 31   | Sigur                        | A.K.Bojan-Anaikatti     | Vegetable and Millets   | 1 acre       |
| 32   |                              | Chandaramohan-Siriur    | Vegetable and Millets   | 1 acre       |
| 33   |                              | Batran-Chokanali        | Vegetable and Millets   | 1 acre       |
| 34   |                              | Rengasamy-Valithottam   | Vegetable and Millets   | 1 acre       |
| 35   |                              | Thandumari-Chemnatham   | Vegetable and Millets   | 1 acre       |
| 36   |                              | Bhasuvan-Kurumbarpalam  | Vegetable and Millets   | 1 acre       |
| 37   |                              | Bhandan-Boothanatham    | Vegetable and Millets   | 1 acre       |

|    |        |                      |                       |        |
|----|--------|----------------------|-----------------------|--------|
| 38 | Pillur | Kali-Sengayur        | Vegetables and pulses | 1 acre |
| 39 |        | Raman-Kodiyur        | Vegetables and pulses | 1 acre |
| 40 |        | Arumugam-Neeradi     | Vegetables and pulses | 1 acre |
| 41 |        | Rengan-Nellimarathur | Vegetables and pulses | 1 acre |
| 42 |        | Mani-Sethumadai      | Vegetables and pulses | 1 acre |
| 43 |        | Selvan-Paralikadu    | Vegetables and pulses | 1 acre |

Indigenous –native pollinators and dependency-plant and Pollinators, exclusively the native Indian Hive bee-*Apis cerana indica*, locally known as **Thodithe**,

200 species of plants have been identified which are important in the millet agriculture system and are bee-pollinated. These are traditionally cultivated and wild plants. Case studies about these plants are being written up and data analyzed on nutrition values and pollinator visitation.

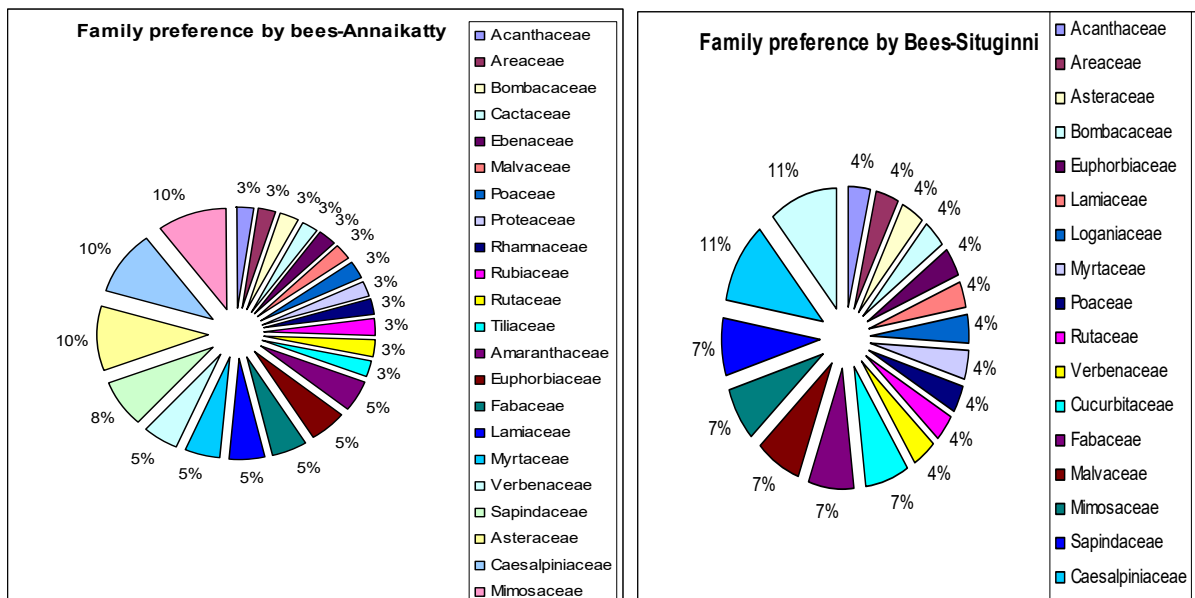


Number spp were observed –like honey bees, solitary bees, wasps, ants, butterflies, moths, birds and small animals

|             |      |       |             |      |       |       |         |          |     |
|-------------|------|-------|-------------|------|-------|-------|---------|----------|-----|
| Arakode     | bees | wasps | butterflies | ants | moths | birds | animals | scurriel | bat |
| Konavakarai | bees | wasps | butterflies | ants | moths | birds | animals | scurriel | bat |
| Pillur      | bees | wasps | butterflies | ants | moths | birds | animals | scurriel | bat |
| Sigur       | bees | wasps | butterflies | ants | moths | birds | animals |          |     |
| Hassanur    | bees | wasps | butterflies | ants | moths | birds | animals | scurriel | bat |

Documenting solitary bee’s nesting behavior and protection of its habitat: Eg. Leaf cutter bee.





**Conserving and creating Habitat for the native pollinators with tribal farmers in their Farms**

Type one Nesting habitat: 1575 nos. Natural Reeds- bunch of 10-12 reeds at length of 6-8inches, two internodes, and diameter of the reed varies from 4mm to 12mm.

Type two Nesting habitat: 445 nos. Wooden blocks/bars, drilled with a depth of 6-8inches, drilled holes are 4mm to 12mm in diameter.

Type three Nesting habitat: 210 nos. Clay pots, with 100 to 125ml

Type four Nesting Habitat: 42 nos. Wooden boxes- rectangular size by 8inchs length, 6 inches height, and 6inches width, primarily to attract Dammar bee and *Apis cerana* bees

Type five Nesting Habitat: identification of existing natural structure like dried logs, fencing pole, field huts, stumps, root stocks, cattle pen walls and protecting with the help farmers in their own farm.

Samples of habitats made out of reeds, clay, wooden hives and bamboo tube



**The result of nesting habitats occupied by Solitary bees in different region:**

| Areas             | Tubular reeds | Bamboo | Wooden blocks | Clay pots | hives | Dead logs |
|-------------------|---------------|--------|---------------|-----------|-------|-----------|
| Sigur             | 187           | 9      | 12            | 16        | 21    | 3         |
| Pillur            | 154           | 6      | 3             | 7         | 11    | 5         |
| Hassanur          | 231           | 26     | 2             | 8         | 19    | 30        |
| Arakode & Coonoor | 126           | 22     | 2             | 1         | 3     | 9         |



Tubular Nesting habitat Created for solitary bees



Wooden hive to rear *Apis cerana*, by a millet farming in Thimbam region



Dammar nest-using clay pot inserted in house wall



*Apis cerana indica* colony clustering outside cavity



Nesting site for *Zylochoba* (carpenter bee) in bamboo tubes

**Identification of Pollinators:**

Apart from identifying specific pollinators visiting specific crops, native pollinator's role, crop productivity benefits, observation through experiments and field trials & demonstrations, links between diversity of crops and presence of number of pollinators & pollination benefits- crop productivity is shared with farmers

This effort created a wave of awareness in protection of natural existing structure during non cultivating seasons within farming groups. The monthly monitoring and observing data is analyzed and finding is shared.

(bee museum info- to be added here)

**Community Seed banks:** are started at different regions, namely in Valithottam village to cater sigur region, Pillur dam for Pillur region, in Kalithimbam and Ittari villages for Thimbam region and in Bangalapadigai for Arakode region. The following table gives the diversity and stock for the farming community

| Cereals   | Pulses   | Vegetables  | Oil seeds                         | tuber                     | greens                                   |
|---|--|---|-----------------------------------|---------------------------|--|
| Ragi,Tenai.Samai, Varagu,Pnaivargu, barnyard,barley,wheat , | Pigeonpea,Green Dahl cowpea,avari, Blackgram,chickpea, | Chillies(4types)gaurds Bendhi,lab laps beans(11types) Brinjal,cucurbits Maize,coriander, Raddish,chowchow | Mustard, Niger, Sunflower, seasam | Yams, Arrouroot, chowchow | Amaranthus Pasalai, Sarkaravathi, palak, |

#### **Farmer Exchange Programme:**

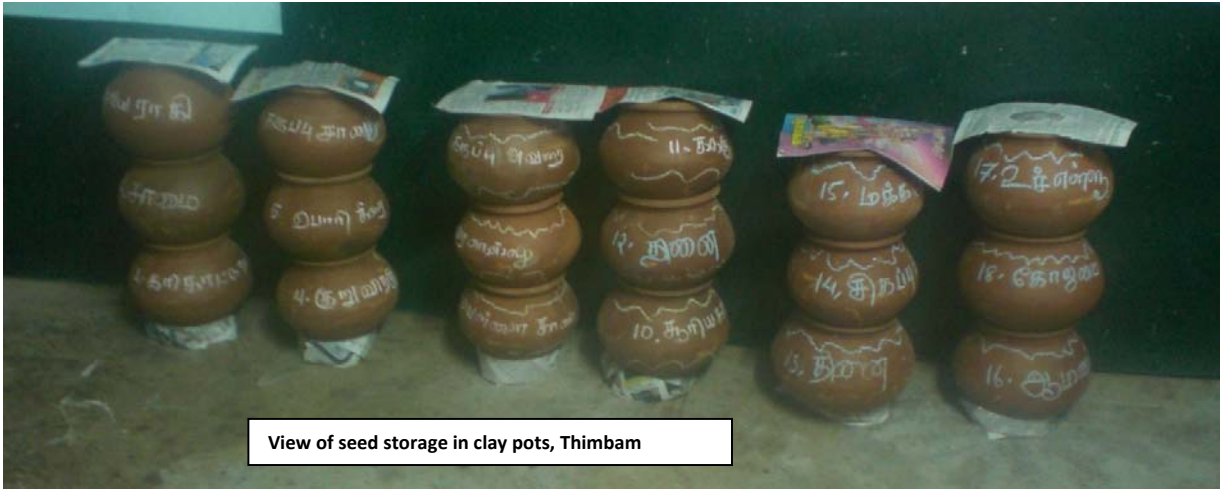
During second week of June eight farmers have visited Karnataka state as part of learning and exchange of information on millet farming systems.**Visit to Green Foundation:** Green foundation is Operating from Thodamaradhalli, Outskirt of Bangalore. The team visited seed storage - cold store gene reserve and three seed banks managed by farmer community. The farmers got an opportunity to learn composting, open yard vermi-composting, preparation of Agni Astra solution, bio pest repellent and traditional seed storage.

Crop varietal study is in progress in Sigur, Pillur, Arakode and Thimbam regions. The crops chosen for this are Ragi, Samai, Tenai, Maize and Grams. The study will be completed by February 2010.

#### **Seed banks are organized in different region:**

Seed banks are organized in four regions with community's participation. Traditional seeds like grains (millet)grams, greens, oil seeds, tubers and vegetable seeds are selectively gathered in local ecological region and stored by chemical free methods. Farmers who have borrowed seed will cultivate organically and return twice the volume to the bank. Such farmers are trained in crop varietal purification practices seed selection processes

The farmer group leader is trained to keep seed stock registers, varietal schedules, stock in-out flow registers and organic/bio control measure.



View of seed storage in clay pots, Thimbam



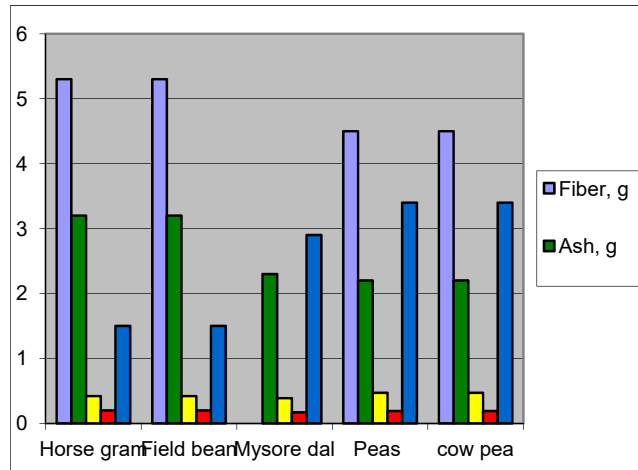
Seed bank inauguration: decorated By Millet ear-heads

Seed bank inauguration ceremony and exchange of seeds between farmer in Thimbam



Generating awareness on millet recipes and nutritional value of millet food:

Total millet meal was served during the farmer's training And sharing of information



Nutritional chart was prepared for Millet Ragi (*Eleusine corocana*), Thenai (*Setaria italica*) Samai (*Panicum sumatrense*) Grams namely, green, black, cow pea, red, Mysore dhal, greens both cultivated and uncultivated. This information is available in local languages and shared in farmer's meeting also displayed in Seed banks.

**Publication of Booklet on Crop and Nutritional value, is in progress will be printed in local language:**

As name suggests Mullu keerai is a Herb with flowers in spike and Botanical name is *Amaranthus spinosa*. Tender leaf is edible. Very common herb in that grows in all seasons in fallow lands, hedges and in millet fields

Pollinator's dependency: Apis cerana, Apis florae, Apis dorsata, Trigona, Amegilla, butterflies, beetles

Community's experience: it improves digestion and as a diuretic.

Food composition: Delicious and highly nutritious which is a rich package of minerals and vitamins which are essential for blood formation, vision, strong structure and many more vital processes. Seventy nine such plants were identified and documented-finalized for a print.

Nutritive value per 100 gm edible portion

| Nutrient      | Value | Units |
|---------------|-------|-------|
| Moisture      | 85    | %     |
| Protein       | 3     | G     |
| Fat           | 0.3   | G     |
| Minerals      | 3.6   | G     |
| Fibre         | 1.1   | G     |
| Carbohydrates | 7     | G     |





|             |      |      |
|-------------|------|------|
| Energy      | 43   | Kcal |
| Calcium     | 800  | mg   |
| Phosphorus  | 50   | mg   |
| Iron        | 22.9 | mg   |
| Carotene    | 3564 | µg   |
| Vitamin – C | 33   | mg   |

\*Source: SI. No. 53 NUTRITIVE VALUE OF INDIAN FOODS 2004

**Revive the practice of Mannukaran the village agriculture resource person who has traditional knowledge of the fertility of the soil, diseases and pest management, weather conditions, forecasting, selection of seed.**

Traditionally practicing (low key) and non practicing leaders-the so called *Mannukarans*, from Arakode, Pillur and Thimbam ,leaders from nine different ancestral regions have participated in the workshop. The pride of such practice is very much alive within the group, yet due to introduction of new seed varieties and various government schemes for agriculture drive away the relationship between Mannukaran and community. In addition to this, up dated knowledge on diseases and market supplies (chemical inputs) is evident of further widening the communication. The commitment is strong from traditional leader to effectively revive the practice. One such strong initiative is to taken-up the seed banks in to their management, conducting training on compost and bio input preparation.

Harvest time:

Mannukaran will visit all the fields and collects the grain – ear heads, cobs and panicles and makes two portions and keeps one for seed purpose at his home the other he takes to temple and does offering and makes festiv food for soil, environment and to God for giving this harvest.

Network with the international NTFP-Exchange Program [www.ntfp.org](http://www.ntfp.org) to use result and understand the process from this initiative for application and introduction to South & South Asian region

An effective exchange programme on pollinators-bees, ecological services provided by bees, sustainable harvesting techniques, value additional of bees wax, honey-economical benefit through community enterprise was conducted. Two such programme were conducted.

Similarly and work shop on organic practices, effective group formation, alternate certification for such ecologically and bee pollinated crop was conducted in SriLanka.