

## Medicinal plant development area in Doddabetta Nilgiri north forest division, Tamil Nadu - an Overview

A. Chitheena<sup>1</sup>, B. Ramakrishnan\*<sup>2</sup> and S. Ramasubramanian<sup>3</sup>

1 & 2 Department of Zoology & Wildlife Biology, Government Arts College, Udthagamandalam 3 District Forest Officer, Harur Forest Division, Harur

### Abstract

The Medicinal Plant Development Area (MPDA) in Doddabetta covers an area of 195.32 ha and falls in the revenue villages of Udthagai Rural, Thuneri and Thummanatty of the Nilgiris district. Cinchona plantation was established in the Nilgiris, a century ago to produce large quantities of quinine sulphates, the prime anti-malarial drug. In over a century and quarter of its existence it has saved millions of lives. However, the importance of quinine as the prime anti-malarial drug has declined substantially with the advent of new synthetic drugs. Due to less demand for the drug from Tamilnadu, the Cinchona department was closed subsequently. The MPDA was established to rehabilitate the labour force in Cinchona department and in due course of time it has evolved into a self-sustaining venture based on sustainable cultivation and marketing of medicinal plants. The present study was attempted to explain the success story of MPDA which was entirely managed on joint forest management principles by the local communities.

Questionnaire survey was attempted to collect primary data from the stakeholders themselves. During the study, 139 respondents were interviewed which included males (n=120) and females (n=19). The present study has recorded fourteen plant species under cultivation at Doddabetta MPDA. Among the medicinal plants, Thyme was cultivated in more area (8.50 acres) followed by Rosemary (5.80 acres) and Java *Citronella* (3.40 acres). Among the seedlings, Rosemary was more preferred (8938313) followed by Thyme (n=1255635) and *Geranium* (n=743900). Apart from the medicinal plants, Shola tree seedlings (n=15000) and Tea seedlings (n=2500) were also raised and planted in the vacant spaces to improve the forest cover.

Till date 16257.66 liters of oil was extracted from fourteen different plants during 1994-2012 at Doddabetta MPDA. *Eucalyptus* (Blue Gum) alone had given 15836.400 liters of Oil which was higher than any other plant, which was about 55.2%. Other plants such as *Cypress* (n=118.575 liters) and *Geranium* (n=117.560 liters) were also utilized for essential oil production. The cost benefit ratio between raw materials and cost involved for oil extraction during 1994-2012 revealed that Rs.136061.30 was paid for the collection of raw material and 20% share was given as per the MOU, to the Forest Department till 31st March 2012. Totally 706 people are living at Doddabetta MPDA. The sex ratio between Male and Female was 1:1.05. When compared to the March 2002 survey, the socio-economic parameters such as owning of radio, tape recorder, house and own land were missing in December 2012 survey. On the contrary, television numbers have increased. It shows there had been significant life style improvement of the people living in the MPDA.

**Keywords :** Cinchona, Doddabetta, Medicinal Plant, MPDA, Nilgiris, Quinine, Shola

### INTRODUCTION

India is rich in medicinal plant diversity. Medicinal herbs have been in use under indigenous systems of medicine like Ayurveda, Siddha and Unani. The plant kingdom still holds many species of plants containing substances of medicinal values, which are yet to be discovered. The total number of plant species of all groups, recorded from India is 45,000. Of which 7,500 plant species are considered to be medicinal plants found in clinical practice and 5,000 traditional medicine manufacturing units operating in India with an estimated annual turnover of Rs.2000 crores (Debnath, 2009). India officially recognizes over 3000 plants for their medicinal values (Dubey et al., 2004). In the

\*Corresponding author,  
E-mail: bio.bramki@gmail.com

present scenario of medicinal plants sector, it is estimated that the 90% of medicinal plants are supplied from the existing plant diversity. Due to over-harvesting in their natural habitats, 315 species of medicinal plants in India have been put on the endangered list of IUCN (Bhattacharya and Mitra, 2001). The Nilgiris is part of the Western Ghats well known for its rich and unique assemblage of fauna and flora. Around 35 per cent of the plant taxon is endemic to Nilgiris and considerable part of which is used as ethno medicine by various tribes of Nilgiris (Selvaraj et al., 2009)

### Medicinal Plant Development Area (MPDA)

Malaria had been a worldwide scourge of man and was rated as a highly fatal illness. During that period, only

known medicine was "Quinine", which has been extracted from the bark of a tree called "Cinchona". The tree is a native of South America. To meet out the worldwide demand for this life saving drug Quinine and Indian demand in particular, then the Government of India had encouraged the Government of Madras and Bengal presidencies and took up cultivation of cinchona trees. Accordingly, Cinchona plantation had been established in the Nilgiris and in the Darjeeling hills over a century ago. In TamilNadu such plantations were raised in Valparai Plateau of Anamalai besides the Nilgiri hills by the Cinchona department. It was established during 1980's and was directed to work on commercial lines in 1925. The Cinchona department had produced large quantities of quinine sulphates, the prime anti-malarial drug. In over a century and quarter of its existence it has saved millions of lives. Perching as an alternative activity, the Cinchona department also took up cultivation of high altitude aromatic and medicinal plants for the production of essential oils, which found diverse use as perfume and in aromatherapy against various human illnesses around 1950s.

The exotic plants cultivated during that time were *Pelargonium graveolens*, *Eucalyptus globulus*, *Eucalyptus Citriodora*, *Dioscorea deltoidea*, *Cymbopogon winterianus* and *Cymbopogon flexuosus*. However the times have changed and the importance of quinine as the prime anti-malarial drug has declined substantially with the advent of new synthetic drugs. Due to less demand for the drug from Tamil Nadu, the importance of Cinchona department has also declined considerably. This has also affected the gainful use of the vast lands and assets of the Cinchona department and its utilization of the man power (Sekar, 2004).

During the handing over of the above lands and the buildings, the tea plantation corporation of Tamilnadu (TANTEA) had retained 32 workers at Doddabetta for the maintenance of mist chamber and on educational grounds. Except these 32 workers, all the others have been ordered to be transferred to other divisions of the TANTEA. Out of these workers, 19 workers had joined TANTEA but have not vacated the quarters at Doddabetta. Another group of workers have not received the transfer orders itself.

A group of 5 workers who had received the transfer orders from TANTEA had not joined duty. In general most of the workers neither joined the duty at TANTEA nor vacated their quarters. Though the TANTEA had requested for the eviction of all the workers from the quarters, it was not done on humanitarian grounds. In the meantime, the area was taken over by the Nilgiris Forest division and was proposed for conversion into R.Fs by notifying them under section 4 of the Tamil Nadu Forest Act, 1882. All the taken over lands are under Forest Settlement process at various stages. Fresh

plantations have also been raised from 1990-91 onwards in the vacant lands under Hill Development Program over an extent of 78.42 Ha.

Around this time, the Foundation for Revitalization of Local Health Traditions (FRLHT), a Bangalore based Non-Governmental Organization under a DANIDA assisted project was engaged in the implementation of a pioneering program in the three southern States of Tamil Nadu, Kerala, and Karnataka to demonstrate as to how the three southern State Forest Departments can effectively conserve medicinal plants that occur in different forest habitats of the states. Three operational models were developed in these states.

(I) Medicinal Plant Conservation Area (MPCA) covering forest areas of 200-300 ha in extent with high bio diversity, particularly valued for medicinal plant diversity, recognized as 'in situ field gene banks' and visualized as no harvest sites', identified and demarcated for protection and management by involving local communities.

(II) Medicinal Plant Development Area (MPDA) where eco-restoration of degraded forest with the replanting of natural medicinal plant species (trees, shrubs, grasses) and their sustainable harvesting are aimed at, Local community is accepted to intensively participate in the regeneration of degraded forests under the JFM frame work with long term benefit sharing by the community.

(III) NTFP-Medicinal Plants Sustainable Harvesting Model, the central objective of which is to rationalize the collection system of wild plants through intensive community organization, in scientific collection and field research to determine sustainable levels of harvest (Anon,1999).

The Doddabetta area ideally fitted into MPDA model and started cultivation of medicinal plants for the past 20 years. This present short term study was attempted to find out whether the MPDA is economically and ecologically sustainable in the long run and fulfilled the objectives for which it was created.

#### Study Area

The Nilgiris is located at N:110.00" and 110.45" latitude and E: 76014" and 770.2" longitude. The study area is located in the Nilgiris North Forest division in Doddabetta, which covers an area of 195.32 ha in the revenue villages of Udthagai Rural, Thuneri and Thummanatty villages of the Nilgiris district. The MPDA area was established by taking over plantations and building of the erstwhile cinchona department by proper transfer of charge.

The MPDA is located at an average elevation of 2,400m above Mean Sea Level (MSL). The area has cultivation of herbaceous medicinal plants requiring temperate and sub-tropical climate. The area falls in an undulating

terrain with moderate slope. Soil type is predominantly lateritic soil of forest type, and small limestone patches, with a PH value of 4. The soil is poor in Nitrogen, deficient in Phosphates, Potassium and Calcium.

Nilgiris receives rains from both monsoon seasons. The Southwest Monsoon which comes from May to September. The Northeast monsoon onsets from November and continues till December. January and February nights can have ground frosts in some areas and very sharp sunlight during the day. From March to the middle of May, there is generally warm sunshine and very occasional rain. Seven streams arise from the micro watersheds to the North. Two other falls from the south towards Ooty. One strong spring feeds the lily pond at the nursery area and supplies drinking water for the house lines. There are about 20-30 cows owned by the local community. They have previously had wide-ranging grazing, which is now more restricted. 139 households were recorded in 2012-13 at MPDA study area. 706 people are living in this hamlet. The MPDA area is drained by 5 small streams, which supports the water supply to the nursery and drinking water for the people.

## METHODOLOGY

Questionnaire survey was attempted from June 2012 to December 2012 in MPDA. Secondary data was collected from the office of the MPDA to collect details using "Precise and Closed". During the study, 139 respondents were interviewed which included males (n=120) and females (n=19). Interview was conducted at least one person from a family. The interviews, were made in the form of conversation (Sindhu, 2012) using

"Broad and Open ended" type of questionnaire to derive socio-economic status of people who are working in MPDA. "Broad and Open ended" questionnaire is a set of questions asked to the respondent to answer freely without any restrictions (Ramakrishnan, 2008).

## RESULTS

**Table 1. Legal status of MPDA village area**

| Revenue Villages   | Area Transferred                 |
|--|----------------------------------|
| Udhagai Town<br>(S.No. 422-4227)   | 48.52 Acres                      |
| Udhagai Rural<br>(S.No. 194,195,197 etc.)  | 386.31 Acres                     |
| Thuneri Village<br>(251, 252, 519 etc.,)   | 49.35 Acres                      |
| Thummanatty village<br>(283/1. 3,5 etc.,)  | 48.16 Acres                      |
|  | <b>532.64 Acres</b>              |
| <b>Deduct:</b> Area already transferred to Agri Farm in S.No.194/1 of Ooty Rural | 50.00 Acres                      |
| <b>Total Area</b>  | <b>482.64 Acres or 195.32 Ha</b> |

The legal status of MPDA revealed that about 195.32 ha land was allocated from Udhagai rural(386.31 Acres), Udhagai town(48.52Acres), Thuneri Village (49.35Acres), Thummanatty village (48.16 Acres), transferred to Agri Farm in Ooty Rural (50.00 Acres) all together. The MPDA was developed not only in town areas and also in adjoining villages.(Table 1)

**Table 2. Medicinal plant seedlings raised at Dodabetta MPDA up to 31.03.2012**

| S.No. | Botanical name                 | Common name | No.of seedling raised |
|-------|--------------------------------|-------------|-----------------------|
| 1     | <i>Rosmarianus officinalis</i> | Rosemary    | 8938313               |
| 2     | <i>Thyme vulgaris</i>          | Thyme       | 1255635               |
| 3     | <i>Pelargonium gravelons</i>   | Geranium    | 743900                |
| 4     | <i>Oregano vulgar</i>          | Oregano     | 670421                |
| 5     | <i>Petroselinium crispum</i>   | Parsley     | 13000                 |
| 6     | <i>Salvia officinal is</i>     | Sage        | 28467                 |
| 7     | <i>Lavendula angustifolia</i>  | Lavender    | 12600                 |
| 8     | <i>Tan acetum parthenium</i>   | Feverfew    | 79150                 |
| 9     | <i>Cineraria martimima</i>     |             | 19000                 |
| 10    | <i>Cymbopogan flexuosus</i>    | Lemon grass | 1232                  |
| 11    | <i>Artemisia dracunculas</i>   | Tarragon    | 760                   |
| 12    | <i>Mislaneous plantations</i>  | Shola tree  | 15000                 |
| 13    | <i>Melaleuca alternifolia</i>  | Tea tree    | 2500                  |
| 14    | <i>Martericaria chamomilla</i> | Chamomile   | 12000                 |
| 15    | <i>Cymbopogan winteriness</i>  | Citronella  | 484750                |
| 16    | <i>Lippie citriodora</i>       | Lemon grass | 10105                 |
|       |                                | Citriodora  | 9967                  |

There were sixteen medicinal plant species seedlings raised at Doddabetta MPDA up to 31.03.2012. Of which, Rosemary seedlings were raised more (n=8938313) followed by Thyme (n= 1255635) and Geranium (n=743900). On the contrary, Tarragon seedlings were raised in very less numbers (n=760) followed by Lemon Grass (n=1232) and Citriodora (n=9967). Apart from the medicinal plants, Shola tree species seedlings (n=15000) and Tea plants (n=2500) seedlings were also been raised (Table 2).

Table 3. Medicinal plantations raised at Dodabetta

| S.No         | Botanical Name                    | Common name | Area (ha.)         |
|--------------|-----------------------------------|-------------|--------------------|
| 1            | <i>Rosmarianus officinalis</i>    | Rosemary    | 4.00               |
| 2            | <i>Thyme vulgaris</i>             | Thyme       | 2.50               |
| 3            | <i>Pelargonium graveolons</i>     | Geranium    | 5.00               |
| 4            | <i>Oregano vulgar</i>             | Oregano     | 3.50               |
| 5            | <i>Cymbopogan winteriness</i>     | Citronella  | 4.50               |
| 6            | <i>Acores calms</i>               | Sweet flag  | 0.40               |
| 7            | <i>Lippie citriodora</i>          | Lemon grass | 0.40               |
| 8            | <i>Gaultheria fragranthissima</i> | Gaultheria  | 0.40               |
| 9            | <i>Centella Asiatic</i>           | Valarie     | 0.40               |
| <b>Total</b> |                                   |             | <b>21.10 (ha.)</b> |

There were nine medicinal plants which were under plantations at Doddabetta MPDA area in 21.10 hectares all together (Table 5). Of which Geranium plants were raised in huge area (n=5 ha.) followed by Citronella (n=4.5 ha.) and Rosemary (4.0 ha.). Sweet flag, Lemon Grass, Gaultheria and Valarie plants were raised in very small area of each 0.40 ha. (Table 3).

Table 4. Details of raw materials collected from Dodabetta MPDA 1994-2012

| S.No. | Material (leaves)     | Qty (kg)<br>(lit) | Oil produced<br>(Rs/Kg) | Cost<br>(Rs) | Total cost | Relative<br>Percentage |
|-------|-----------------------|-------------------|-------------------------|--------------|------------|------------------------|
| 1     | Eucalyptus (Blue gum) | 791520            | 15836.400               | 0.20         | 158304.00  | 55.2                   |
| 2     | Cypress               | 29643             | 118.575                 | 1.00         | 29643.00   | 10.3                   |
| 3     | Citronella            | 10425             | 62.550                  | 0.20         | 20850.00   | 7.3                    |
| 4     | Peppermint            | 145               | 0.875                   | 0.50         | 72.50      | 0.0                    |
| 5     | Rosemary              | 2512              | 20.100                  | 1.00         | 2512.00    | 0.9                    |
| 6     | Thyme                 | 2696              | 16.180                  | 1.00         | 2696.00    | 0.9                    |
| 7     | Citriodora            | 5756              | 46.050                  | 1.00         | 5756.00    | 2.0                    |
| 8     | Gaultheria            | 30195             | 30.195                  | 0.25         | 7548.75    | 2.6                    |
| 9     | Basil                 | 400               | 0.200                   | 0.20         | 80.00      | 0.0                    |
| 10    | Sage                  | 140               | 0.560                   | 1.00         | 140.00     | 0.0                    |
| 11    | Geranium              | 117560            | 117.560                 | 0.50         | 58780.00   | 20.5                   |
| 12    | Lavender              | 852               | 5.115                   | 0.50         | 426.00     | 0.1                    |
|       |                       |                   |                         |              | 286808.25  | 100                    |

The cost benefit ratio between raw materials and cost involved for oil extraction and total profit has been collected from Doddabetta MPDA during 1994-2012. The plant species such as Citronella, Eucalyptus (Blue Gum) and Basil were considered to be the high cost benefit plants in oil extraction (Table 4). At the rate of Rs.0.20 is only needed for oil extraction from one kilogram of leaf. On the contrary, Rs. 1.00 per Kg. was spent for Cypress, Rosemary, Thyme, Citriodora and Sage followed by Rs.0.50 per Kg. for the plants such as Peppermint, Geranium and Lavender and Rs. 0.25 per Kg. for Gaultheria (Table 4). Totally Rs. 286808.25 was earned from twelve oil plants at Doddabetta MPDA.

Of which Eucalyptus (Blue Gum) was found relatively high percentage (55.2%) followed by Geranium (20.5%) and Cypress (10.3%).

Table 5. 20% share of raw material cost paid and due the Forest Department till 31<sup>st</sup> March 2012

| Year    | Value of raw material collected | 20% Share of raw material cost |
|---------|---------------------------------|--------------------------------|
| 1994-99 | 254576.50                       | 50915.30                       |
| 99-2000 | 27314.50                        | 5463.00                        |
| 2000-01 | 61670.00                        | 12334.00                       |
| 01-02   | 52804.10                        | 10561.00                       |

|              |                  |         |
|--------------|------------------|---------|
| 02-03        | 32900.50         | 6580.00 |
| 03-04        | 26652.10         | 5330.00 |
| 04-05        | 22428.20         | 4486.00 |
| 05-06        | 30772.10         | 6154.00 |
| 06-07        | 27589.40         | 5518.00 |
| 07-08        | 23765.00         | 4753.00 |
| 08-09        | 22017.10         | 4403.00 |
| 09-10        | 32062.90         | 6413.00 |
| 10-11        | 32281.40         | 6456.00 |
| 11-12        | 33474.60         | 6695.30 |
| <b>Total</b> | <b>136061.60</b> |         |

Totally Rs. 136061.60 was paid for the collection of raw material and 20% share was given to the Forest Department as per the MOU till 31st March 2012 at Doddabetta MPDA. Highest share of Rs. 12334 was paid during 2000-2001 followed by Rs.10561 during 2001-2002 and Rs. 6695.30 during 2011-2012. On the other hand, very low amount of share (Rs.4403) was paid during 2008-2009 followed by Rs.4486 was paid during 2004-2005 and Rs.4753 was paid during 2007-2008 (Table 5)

**Table 6. Demographic status of people living in the MPDA village (n=139)**

| S.No                    | No of habitation (n=139) | Number of people | Sex Ratio   |
|-------------------------|--------------------------|------------------|---|
| 1                       | Male                     | 220              | General Male and General Female<br>Sex ratio = 1:1.05 |
| 2                       | Female                   | 232              |   |
| 3                       | Adult Male               | 120              | Adult Male and Adult female<br>Sex ratio = 1:1.11     |
| 4                       | Adult Female             | 134              |   |
| <b>Total Population</b> |                          | <b>706</b>       |   |

706 people are living at Doddabetta MPDA. Of which General female (n=202) and Adult female (n=134) were more than General male (n=220) and Adult male (n=120). The sex ratio between General Male and General Female was 1:1.05. Similarly Adult male and adult female sex ratio was 1:1.11 (Table 6).

**Table 7. Socio Economic statuses of MPDA households**

| Socio economic parameter | No of households |          |          |
|--------------------------|------------------|----------|----------|
|                          | Dec 1994         | Mar 2002 | Dec 2012 |
| House current            | 2                | 38       | 139      |
| Television               | -                | 30       | 139      |
| Radio                    | 5                | 34       | -        |
| Tap                      | 1                | 33       | -        |
| 2wheeler                 | -                | 1        | 22       |
| 4 wheeler                | -                | 4        | 18       |
| Mixie                    | -                | 14       | 139      |
| Grinder                  | -                | 10       | 139      |

|                          |             |               |                  |
|--------------------------|-------------|---------------|------------------|
| Own house                | -           | 6             | -                |
| Mulch animal             | 6           | 15            | 12               |
| Own land                 | -           | 3             | -                |
| Lease land               | -           | 7             | 25               |
| Other business           | 1           | 4             | 6                |
| Monthly income (Rs)      | 250 to 1000 | 2000 to 10000 | 6000 to 15000    |
| Bank income deposit (Rs) | -           | 5000 to 11000 | 25000 to 2 lakhs |

The socio-economic status of the people living in Doddabetta MPDA was assessed during December 1994; March 2002 and December 2012 for this present study. The result revealed that all socio-economic parameters were available in the March 2002 survey. When compared to the March 2002 survey, the socio-economic parameters such as owning of radio, tape recorder, own house and own land were missing in December 2012 survey. Although radio and tape recorders were missing, but television numbers have considerably increased. It is quite interesting to note that most of the socio-economic parameters were increased in December 2012, when compared to December 1994 survey. It was unfortunate that Own house (n=6) and Own land (n=3) were lost in December 2012 when compared to March 2002 survey.

**Table 8. Income and expenditure statement of Dodabetta MPDA from inception (1994) to 31<sup>st</sup> March 2012**

| S.No                     | Particulars            | Amount (Rs)           |
|--------------------------|------------------------|-----------------------|
| <b>Revenue:</b>          |                        |                       |
| 1                        | FRLHT Grants           | 17,59,281.00          |
| 2                        | Sales at MPDA          | 5,52,80,203.27        |
| 3                        | State Government funds | 13,72,060.00          |
| <b>Total</b>             |                        | <b>5,84,11,544.27</b> |
| <b>LESS: Expenditure</b> |                        | <b>5,79,71,274.39</b> |
| Gross Profit / Surplus   |                        | 4,40,269.88           |

The abstract for the Doddabetta MPDA accounts revealed that the FRLHT had invested Rs. 17,59,281.00, Sales at MPDA was recorded as Rs. 5,52,80,203.27, and State Government supported to the tune of Rs.13,72,060.00. The total amount transacted in MPDA till March 2012 was Rs. 5,84,11,544.27. The expenditure incurred from the date of establishment of MPDA to till March 2012 was Rs. 5,79,71,274.39. It is pertinent to note that most of the expenditure was incurred as wages to the workers which indicated gainful employment and cash flow to the work force. The success of the Doddabetta MPDA was noticed from the Gross profit available at the end of March 2012 which was Rs.4,40,269.88.

## DISCUSSION

Cinchona plantation had been established in Nilgiris and in the Darjeeling hills over a century ago. In Tamil Nadu, such plantations were raised in Valparai plateau of Anamalais besides the Nilgiri Hills by the Cinchona Department, established during the 1860s, and was directed to work on commercial lines in 1925. The department had produced large quantities of quinine sulphates, the prime anti-malarial drug. In over a century and quarter of its existence it has saved millions of lives. Pursuing as an alternative activity, the Cinchona Department also took up cultivation of high altitude aromatic and medicinal plants for the production of essential oils, which found diverse use as perfume and in aromatherapy against various human illness around the 1950s. However, the times have changed and the importance of quinine as the prime anti-malarial drug has declined substantially with the advent of new synthetic drugs. Due to this, the demand for the drug from Tamil Nadu Cinchona Department has also declined considerably. Subsequently, the area was taken over by the Nilgiris forest division and was proposed for conversion into R.Fs by notifying them under section 4 of the Tamil Nadu Forest Act, 1882. All the taken over lands are under Forest Settlement process at various stages. Fresh plantations have also been raised from 1990-91 onwards in the vacant lands under Hill Area Development Program in an extent of 78.42 Ha.

Medicinal Plant Development Area (MPDA) was initiated by the forest department by joining hands with FRLHT. Eco-restoration of degraded forest with the replanting of natural medicinal plant species (trees, shrubs, and grasses) and their sustainable harvesting are aimed at. Local community is expected to intensively participate in the regeneration of degraded forests under the JFM framework with long term benefit sharing by the community.

In MPDA, 195.32 Ha land was allocated from Udhagai Town, Rural, Thuneri, Thummanatty villages. Among the area allotted to MPDA, maximum area was allocated by the forest department during 1993 to raise miscellaneous plantations from 1991 to 1993. The plantations raised by the forest department were mainly used for extracting oil from the *Eucalyptus globulus*.

Eleven such plants were under practice in MPDA. The important medicinal plants are *Rosmarianus officinalis* (Rosemary), *Thyme vulgaris* (Thyme), *Pelargonium gravelons* (Geranium), *Oregano vulgar* (Oregano), *Petroselinium crispum* (Parsley), *Salvia officinis* (Sage), *Lavendula angustifolia* (Lavender), *Tanacetum parthenium* (Feverfew), *Cymbopogan flexuosus* (Lemon grass) and *Artemesia dracunculas* (Tarragon), of which rosemary seedling where planted more than other

plants, followed by Thyme and Geranium. These 3 plants are having high market value than others. (Selvaraj et al 2009). There were twelve medicinal plants used for oil extraction in the MPDA. Of which *Eucalyptus*, *Citronella* and *Basil* were highly profitable plants, because of low cost of production, ie, just 20p/kg.

Although cypress is available in more quantity, the cost involved for oil extraction was estimated at about Rs.1 per/ Kg. Similarly, *Rosemary*, *Thyme* and *Citronella* are available in rich quality but they also require Rs.1 per/ Kg, for extraction of oil. Therefore *Eucalyptus*, *Citronella* and *Basil* were considered to be the profitable plants in MPDA.

The study found fluctuations in 20% share paid to the forest department for the collection of raw materials. To this is mainly because of stability of the values on the quantities of medicinal plants for the period of 15 years. The total population has increased from 581(1991) to 706(2012). This showed that the MPDA program provided all basic necessities for the increasing population. When compared to March 2002 survey, the socio-economic parameters such as radio, tape recorder, own house and own land were missing in December 2012 survey. Although radio and tape recorders were missing, but television numbers have considerably increased. It is quite interesting to note that most of the socio-economic parameters were increased in December 2012 when compared to December 1994 survey. It was unfortunate that Own house (n=6) and Own land (n=3) were lost during December 2012 when compared to March 2002 survey. This has to be viewed seriously.

The basic economic parameters like monthly income per person and Bank deposits showed that the MPDA is a successful program ensuring a better socio-economic status to the people. Although unfortunately 6 people had lost their own house and 3 people had lost their own land during this period, they have not shifted their residence from MPDA. The MPDA administration needs to find out reasons behind for the assets lost by the 9 persons. This would help to understand whether the MPDA fulfilled all the objectives for which it was created.

The abstract for the Doddabetta MPDA accounts revealed that the FRLHT had invested Rs. 17,59,281.00, Sales at MPDA was recorded as Rs. 5,52,80,203.27, and State Government supported to the tune of Rs.13,72,060.00. The total amount transacted in MPDA till March 2012 was Rs. 5,84,11,544.27. The expenditure incurred from the date of establishment of MPDA to March 2012 was Rs. 5,79,71,274.39. It is pertinent to note that most of the expenditure was incurred as wages to the workers which indicated gainful employment

and cash flow to the work force. The success of the Doddabetta MPDA was noticed from the Gross profit available at the end of March 2012 which was Rs.4,40,269.88.

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