

QUALITY PLANTING MATERIAL PRODUCTION AND CULTIVATION OF MEDICINAL PLANTS: SUCCESS STORIES FROM SOUTHERN INDIA



REGIONAL CUM FACILITATION CENTRE (SOUTHERN REGION)
National Medicinal Plants Board, Ministry of AYUSH, Government of India
KSCSTE - Kerala Forest Research Institute

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**Quality Planting Material Production and Cultivation of
Medicinal Plants: Success Stories from Southern India**

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Disclaimer:

The editors have taken utmost care to ensure that this book provides useful information on cultivation, management and harvest of different medicinal species as crisp as possible. However, the Principal Investigator (PI) and farmers of Quality Planting Material (QPM) projects have the ultimate responsibility for the contents included in the book.

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Dr. P. Sujanapal
Principal Investigator





PREFACE

Quality of planting material is key to survival, productivity and quality of any crop; this is quite true for medicinal plants as well. Quality implies both genetic and physical. Genetic quality is ensured by procuring source-certified superior seeds or other planting materials. Physical quality can be ensured through stringent agrotechniques in nurseries. Considering the importance of producing quality planting materials (QPMs) for the benefit of farmers, NMPB has been funding QPM programmes through Central Sector Schemes and through RCFC grant-in-aid. Implementation of the QPM projects by RCFC (Southern Region) has enabled several farmers to take up commercially important medicinal plants for cultivation. The initiative of the RCFC (SR) team helped to bring out success stories from this programme. This publication will serve as a guide for those interested in taking up commercial cultivation by taking clues from fellow-farmers.

Editors



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Ministry of AYUSH
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National Medicinal Plants Board
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FOREWORD

Plant-based healthcare system has made a significant impact in the wellness sector globally, creating a greater demand for medicinal plants by AYUSH and other herbal industries. To meet their demand these industries are largely depending on plants sourced from wild. But, degradation of forests either due to overexploitation or human interventions has led to considerable resource depletion. Also, the scientific studies have led to identification of several molecules that have demonstrated preventive or curative action against several animal disorders and this scenario has led to the need of promoting large-scale cultivation of medicinal plants species in farm lands.

Medicinal plants cultivation, while bridging gap between demand and supply, brings in additional income for farmers apart from labour generation for livelihood of the farm-dependent rural community. Moreover, the medicinal plants sector is increasingly becoming a source of foreign exchange as well.

The major challenges faced by the farmers are the non-availability of quality planting material and the agro-techniques for cultivation. As understood, this problem has been well-addressed by RCFC (Southern Region) of NMPB through developing Quality Planting Material (QPM) of medicinal plants in different locations of the southern region in partnership with different agencies and providing training for nursery development and cultivation, post-harvest technologies and facilitating marketing.

The present compilation containing success stories of 22 farmers who profitably raised 22 commercially important medicinal plants is a valuable hand book and will encourage the farmers for taking up cultivation of medicinal plants.

With great pleasure, I congratulate the RCFC (Southern Region) team in their earnest endeavor in furthering the cause of medicinal plants though promoting cultivation of medicinal plants on farm lands and bringing out the outcome through such a useful publication.

Prof.(Dr.) Mahesh Kumar Dadhich



*if the wisdom is herbal,
many ailments are curable*

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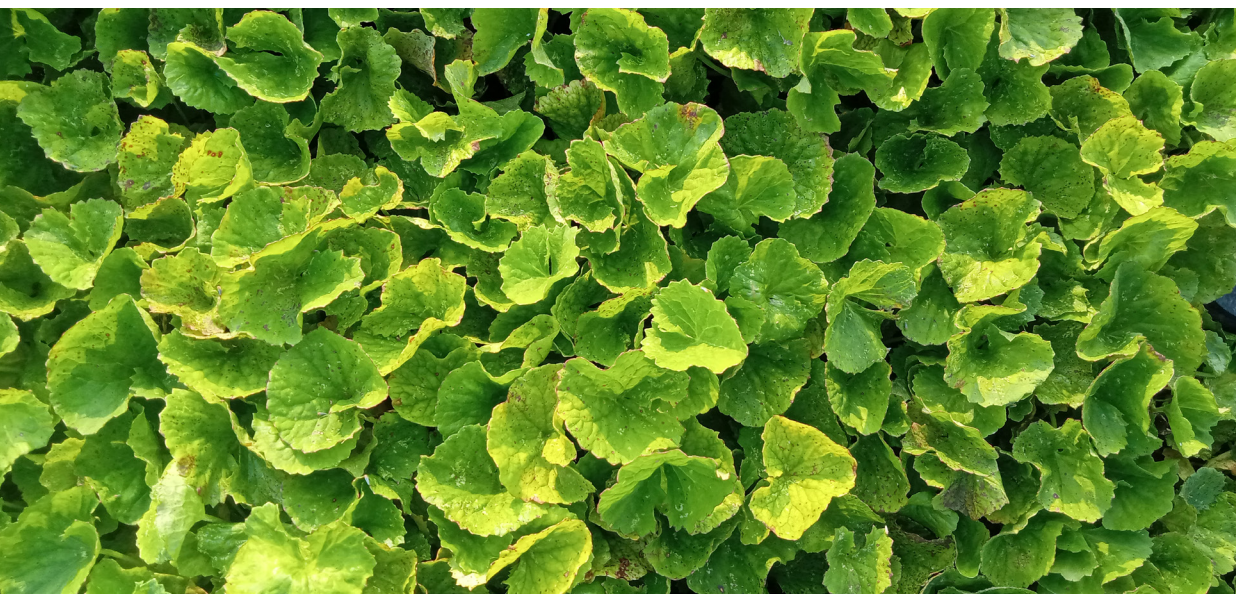
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INTRODUCTION

Quality Planting Material (QPM) is a healthy, disease-free, source-certified quality seeds, seedlings, rooted cuttings, rhizomes, slips etc. recommended for commercial production of medicinal plants. Easy access by farmers to locally adapted QPMs is crucial for medicinal plants production to meet the increasing market demand. Though many farmers are interested in large scale commercial cultivation of much sought-after medicinal plants, the non-availability of quality planting materials often becomes a deterring factor. Therefore, it is an urgent need to make available quality planting materials of medicinal plants for sustained production and supply of raw materials to the herbal industry. Taking account of this fact, NMPB had formulated a Central Sector Scheme to provide financial assistance to develop nurseries and quality planting materials / germplasm banks with the object of making available superior planting stock. In addition to this Central Sector Scheme, NMPB also supports all its Regional Cum Facilitation Centres (RCFCs) in the country in producing quality planting materials of region-specific medicinal plants and distributing them among farmers' clusters for enhancing the resource base of medicinal plants in each region. Accordingly, the RCFC (Southern Region), supported 28 agencies (implementing partners) in Andhra Pradesh, Karnataka, Kerala, Tamil Nadu and Telangana to produce QPMs of 59 species and distribute among farmers' clusters and other stakeholders for cultivation during 2018 to 2023.

This book contains on account of QPM production practices of 22 profitable medicinal plants (chosen from the 59 species cultivated by farmers), including their cultivation, management, yield and economics as informed/documentated by the farmers. This will serve as a motivating guide to other farmers of the region to take up cultivation of medicinal plants with greater confidence.



1. *Acorus calamus* L.

Sweet flag, Sweet root, Gudwach (Trade names)

Ghorbach, Safedbach, Bach (Hindi names)

Baje, Athibaje, Naaru beru (Kannada names)

Vashampa, Vayambu (Malayalam names)

Vashambu, Pullai-valathi (Tamil names)

Vadaja, Vasa (Telugu names)



***Acorus calamus* L.**

Acorus calamus is a strongly aromatic semi-aquatic perennial herb with creeping rhizomes. The rhizome is effective for the treatment of epilepsy and body paralysis. It is also used as brain tonic, for toning voice, to flavour alcoholic beverages etc. The rhizomes contain Asarone compounds which are used to treat throat infections, stomach ache, fever, liver diseases, epigastric pain, kidney ailments, leukoderma, asthma, diarrhoea etc.

QPM Production and Cultivation

QPM Producer



Dr. K. Nagi Reddy

Nagireddy Gudem Village, Palkaveedu
Mandal, Suryapet District, Telangana
Phone : 9704941577

Grower



Sri. K. Saidi Reddy

Bette Gudem Village, Palkaveedu Mandal,
Suryapet District, Telangana
Phone: 9494146868

Dr. K. Nagi Reddy collected the rhizome cuttings of *A. calamus* from his farm for raising QPMs in his nursery. He collected fresh rhizome cuttings with 2-3 internodes dibbled them in mother beds. Before dibbling the rhizome cuttings in mother beds, land was prepared by ploughing and followed by farmyard manure application. Irrigation was done by flooding practice. The rhizome sprouted after 7 - 14 days. The uprooted two-month-old rhizomes were used as the Quality Planting Materials.



45 days old plants of *Acorus calamus* in the nursery of Dr. Nagi Reddy at Nagireddy Gudem Village, Telangana



Quality Planting Material of *Acorus calamus* produced by Dr. K. Nagi Reddy

Dr. K. Nagi Reddy produced 3,00,000 QPMs of *A. calamus* and supplied them to nearby farmers for cultivation in their farmlands. Sri. K. Saidi Reddy of Bette Gudem Village, Palkaveedu (Total annual rainfall is 821 mm, mean annual temperature is 40°C. Soil sandy loam and slightly acidic, pH 6) received 70,000 *A. calamus* saplings to cultivate in his 0.6 ha land.



Seven months old *Acorus calamus* in the farmland of Sri. Saidi Reddy



Field planting of *Acorus calamus* in July 2020 in farmland of Sri. Saidi Reddy

The QPMs were transplanted in the main field in July 2020 at the spacing 30cm × 30cm. Crop was managed by providing flooding irrigation with water level up to 5cm in depth (over the crop plants) and farmyard manure application. The first weeding was done in the field after 30 days of planting. The crop matured in 9 to 10 months and ready for the harvest.



Semi processing of *Acorus calamus* rhizomes by using polishing machine

The estimated total yield (dry weight) of *A. calamus* was 2,500 kg per hectare with a total gross income Rs. 1,50,000 and net income of Rs. 87,500 per hectare. The cost of cultivation was Rs. 62,500 and thus, the B:C ratio was 2.4, during cropping period of one year. *A. calamus* cultivation also generated about 180-man days of work per hectare.

With the RCFC (SR) support, Dr. Nagi Reddy and other farmers cultivated *A. calamus* in 2.42 ha during 2020-21.

Prepared by P. Chiranjeevi and M. Sumod



2. *Alpinia calcarata* (Andrews) Roscoe

Lesser galangal (Trade name)

Kulanjan (Hindi name)

Rasme gedde (Kannada name)

Chittaratha, Aratha (Malayalam names)

Perarathai (Tamil name)

Pedda-dumparashtram (Telugu name)



***Alpinia calcarata* (Andrews) Roscoe**

Alpinia calcarata, is a rhizomatous perennial herb. The rhizomes of this plant are used in formulations for the treatment of indigestion, impurities of blood, throat inflammation and voice improvement. Rhizomes of *Alpinia calcarata* possess antibacterial, antifungal, anthelmintic, antioxidant, aphrodisiac, anti-inflammatory, gastroprotective, and antidiabetic properties. In traditional medicines, the rhizomes are used for treating various ailments including rheumatic joint pains, cough and colds, and hoarseness of voice.

QPM Production and Cultivation

QPM producer and grower



Sri. K.R. Sanjay (on the extreme right)
Sakshibeedu village, Akki Hebbal,
K. R. Pete Taluk, Mandya District, Karnataka
Phone: 07795464410

Sri. K.R. Sanjay produced 45,000 QPMs of *A. calcarata* in his nursery at Sakshibeedu, Karnataka from rhizomes collected from his farm and supplied to many farmers for cultivation. Sri. Sanjay also planted in his farm (Annual rainfall is 693 mm, mean annual temperature is 24°C, Soil red sandy loams and acidic with pH 6.8) in open space and as an intercrop with coconut.

The propagules of *A. calcarata* were transplanted in June-July 2021 in raised beds (each of 2 m x 4 m in size; 60 cm between two beds) at a planting spacing of 45 cm x 30 cm. Crops were managed by irrigating and applying farmyard manure.

Farmyard manure was applied two times after planting, at six months interval. Inorganic fertilizers and pesticides were not used. For controlling weeds, mulching was done and space between beds were ploughed using a mini-tiller.

The leaves and mainly rhizomes are used in herbal industry and they were ready to harvest eighteen to twenty months after planting. The green leaves were harvested just before uprooting rhizomes and air-dried. The rhizomes were collected, cleaned of roots and then air-dried for storing. While harvesting the rhizomes, a few rhizomes with two new shoots were retained in the beds so that they could grow and yield crops in the next season.



A QPM of *Alpinia calcarata* is a shoot-rhizome portion with two to three healthy buds



Alpinia calcarata farm at Sakshibeedu village, Akki Hebbal, K. R. Pete Taluk, Mandya District, Karnataka

From this crop, on a hectare basis, the estimated total rhizome yield (dry weight) was 4,000 kg per hectare with a total gross income of Rs. 6,40,000 and net income of Rs. 2,95,000 per hectare. The cost of cultivation was Rs. 3,45,000 per hectare with an B:C ratio of 1.9. During cropping period of eighteen months, about 245 man-days of work per hectare were also generated. With the RCFC (SR) support, Sri. K.R. Sanjay promoted cultivation of *A.calcarata* in 4 ha during the year 2020-2021.

Prepared by C.A. Akhil and M. Sumod



3. *Andrographis paniculata* (Burm.f.) Wall. ex Nees

Kalmegh (Trade name)

Nela bevu (Kannada name)

Nilaveppu, Kiriyaatta (Malayalam names)

Nilavempu (Tamil name)

Nilavemu (Telugu name)



***Andrographis paniculata* (Burm.f.) Wall. ex Nees**

Andrographis paniculata, the king of bitter is an herbaceous plant found throughout tropical and subtropical Asia, including India. It is a highly sought medicinal crop in great demand for the preparation of many drugs used in managing liver related diseases as it protects the liver due to its antioxidant and anti-inflammatory activity. In Ayurveda, leaf powder and root extracts of *A. paniculata* are used to manage arthritis, diabetes, eczema, boils and skin infections. In India, it is being used in traditional medicine, as remedy for cold, fever and detoxification of the body.

QPM Production and Cultivation

Dr. P. Radha, Research Officer of SMPG, produced 10,408 QPMs of *A. paniculata* in their nursery of SMPG, Mettur from seeds collected from their medicinal plants garden and supplied 1,000 poly-potted seedlings to Sri. Venkatachalam for planting in his field at Govindappadi (Total annual rainfall is 908.4 mm (35.76 inches), Mean annual temperature is 31° C. Soil red and acidic, pH= 6.5).

QPM Producer



Dr. P. Radha

Research Officer (Botany), I/c, Siddha
Medicinal Plants Garden (SMPG),
Ulavar Sandhai, Cauvery Nagar,
Mettur Dam – 636 401, Tamil Nadu

Grower



Sri. Venkatachalam

Govindappadi, Mettur Taluk,
Salem District, Tamil Nadu- 636303
Phone: 9994194705

Seedlings were transplanted in July 2022 in raised beds (each of 2 m x 4 m in size; space between two beds is 60 cm) at a planting spacing of 60 cm x 20 cm. Crops were managed by providing irrigation and farmyard manure. Inorganic fertilizers and pesticides were not used. The crop flowered and produced fruits in 3 months after field planting. Seeds were collected before harvesting the crop in November 2022.



Containerized 2 months old QPMs of *Andrographis paniculata* with 25 cm to 30 cm height

Andrographis paniculata farm at Govindappadi, Mettur Taluk, Salem District, Tamil Nadu- 636303.

From this short duration crop, on hectare basis, 40 kg of seeds (~88,80,000 seeds) were obtained. The estimated total yield (dry weight) was 4,620 kg per hectare with a total gross income Rs. 1,84,800 and net income of Rs. 73,425 per hectare. The cost of cultivation was Rs. 1,11,375 and thus, with a B:C ratio of 1.6. *A. paniculata*, during the cropping period of five months, also generated about 285-man days of work per hectare.

Prepared by M. Bharathiraja and P. Dineshkumar



4. *Bacopa monnieri* (L.) Pennell

Brahmi (Trade name)

Baam, Barami, Brahmi, Jalbuti (Hindi names)

Brahmi, Jalabrahmi, Kiru Brahmi, Neeru Braahmi (Kannada names)

Brami, Neerbrahmi (Malayalam names)

Brammi (Tamil name)

Jalabrahmi, Sambarani chettu (Telugu names)



***Bacopa monnieri* (L.) Pennell**

Bacopa monnieri is a semi-succulent herb with creeping stem and ascending branches. The plant that has been used for centuries in traditional Ayurvedic medicine as a neuro-tonic for memory booster and also used in the treatment of cardiac, respiratory and neuro-pharmacological disorders like insomnia, insanity, depression, psychosis, epilepsy, and stress. It also possesses anti-inflammatory, analgesic, antipyretic, sedative, free radical scavenging and anti-lipid per oxidative activities.

QPM Production and Cultivation

QPM Producer	Grower
 <p data-bbox="175 1073 648 1208">Smt. K. Aruna Kumari Nagireddy Gudem Village, Palkaveedu Mandal, Suryapet District, Telangana. Phone: 9704941577</p>	 <p data-bbox="714 1073 1225 1208">Smt. S. Achamma Bettegudem Village, Palkaveedu Mandal, Suryapet Mandal, Telangana. Phone: 9640804553</p>

Smt. K. Aruna Kumari, produced 1,00,000 QPMs of *B. monnieri* in her nursery at Nagireddy Gudem Village, Suryapet, Telangana from the stem cuttings collected from neighbouring farmers' field. The QPMs were supplied to the farmers for cultivation. Smt. S. Achamma, received 70,000 QPMs of *B. monnieri* for cultivation (Total annual rainfall is 821 mm, mean annual temperature is 40°C. Soil sandy loam and slightly acidic, pH 6).

Freshly collected stem cuttings with 4-8 internodes were planted in mother beds during April 2021. Irrigation was done by flooding practice. The stem cuttings were rooted after 2 weeks. The uprooted two-months old saplings (with 15 - 20 cm length with 8 - 10 pairs of leaves, 3 - 5 cm root length) were used as the Quality Planting materials.

The QPMs were transplanted in the main field during July 2021 (spacing of 15cm x 15cm). Crop was managed by providing flooding irrigation with water level up to 3-5 cm in depth (over the crop plants). The first weeding was done in the field after 20 days of planting. Crop will be ready to harvest 90 days after field planting. Aerial portion of the plants were harvested three times in a year at the intervals of three months. Harvested plant material was sun-dried and packed in moisture proof poly bags.



QPMs of *Bacopa monnieri* ready for distribution



Bacopa monnieri field in the Bettagedem Village, Palkaveedu Mondal, Suryapet Mandal, Telangana



RCFC (SR) and SMPB, Telangana officials at *Bacopa monnieri* field in the Bettagedem Village, Palkaveedu Mondal, Suryapet Mandal, Telangana

The estimated total yield (dry weight) was 2,500 kg per hectare with total gross income and net income of Rs. 1,10,000 and Rs. 55,000 per hectare respectively. The cost of cultivation was Rs. 55,000 per hectare per year, and the B:C ratio is 2.0. During the cropping period of one year, about 120 women days of work also generated/ha.

With the RCFC (SR) support, Smt. K. Aruna Kumari promoted the cultivation of *B. monnieri* in one-hectare land during the year 2021-2022.

Prepared by P. Chiranjeevi and P. Dineshkumar



5. *Centella asiatica* (L.) Urban

Mandukparni, Indian penny wort (Trade names)

Vandelaga, Brahmisappu (Kannada names)

Kondangal, Mutthil (Malayalam names)

Vallarai (Tamil)

Saraswati aaku, Vallaraku, Brahmi (Telugu names)



***Centella asiatica* (L.) Urban**

Centella asiatica is a tropical perennial, prostrate herb used in medicinal and culinary practices of many countries, such as, India, Sri Lanka, China, Indonesia and Madagascar. It occurs in wet places in tropical and subtropical regions. The plant is used for the treatment of a wide variety of disorders, such as, skin diseases, rheumatism, inflammation, syphilis, mental illness, epilepsy, hysteria, dehydration, and diarrhoea. Above all, it is used as a nerve tonic for improving memory and insanity. The economic part of *C. asiatica* is leaf. Fresh or dried leaves are used by drug industries.

QPM Production and Cultivation

QPM Producer and Grower



Sri. Mahadeva D Pawar

Sneha Aushadhi Haagu Sugandha Belegarara Sangha,
Kalasapura, House No. 216, 11th Colony, Kalasapura Road, Gadag - 582103, Karnataka
Phone: 9916890225, 9148406652

Sri. Mahadev Pawar brought 1,100 kg rooted plants of *C. asiatica* from Indian Institute of Horticultural Research (IIHR), Bangalore and transplanted them at a spacing of 60 cm x 40 cm at Gadag during March 2021 (average annual rainfall 500 mm, mean annual temperature 34°C, black soil, pH 8). The varieties he chose were Dhanwantri and Lucknow.

C. asiatica is propagated through stem cuttings comprising of rooted node with few leaves. Cuttings are either directly planted in the field or alternatively established in nursery beds and after about 4-6 weeks, are transplanting in the main field.

To plant one-hectare area, about 1,00,000 (total weight is about 27.5 kg) stem cuttings are required.

The land is ploughed well and brought to fine tilth. Later it is divided into convenient sized beds. Black cotton soil is best suited for cultivation of *C. asiatica*. A light irrigation should be provided one to two days before planting to get good anchorage to roots.

Sri. Mahadev Pawar, applied about 5, 000 kg FYM per hectare as basal dose at the time of land preparation. A light irrigation was given after first planting. The light irrigation is required at every 4-6 days interval till the plants get established firmly. Thereafter, the irrigation is subjected to the field condition and as per the crop requirement. Sri. Mahadev Pawar followed drip irrigation for efficient management of water and to prevent growth of weeds. Weeding was done at 15-20 days interval during the initial months.



C. asiatica yields 750 to 1,000 kg fresh leaves per hectare from a single harvest and yield can be obtained 4 times a year.

The total cost of cultivation in the first year comes around Rs. 1,75,000 per ha. Thereafter cost reduces to Rs. 1,00,000 per ha. for the subsequent years. The crop can be harvested for up to 6 years. The selling price of *Centella* vary from Rs. 70 to 100 per kg in the market. The average revenue from *Centella* cultivation comes around Rs. 2,50,000 to Rs. 4.25,000 per ha per year. B:C ratio is coming around 3.3 which indicates *Centella* is a profitable crop for the farmer. *Centella* requires 80 to 100 labour days in a year for cultivation at the rate of Rs. 300 per person per day. Under this QPM project, Sri. Mahadeva Pawar promoted the cultivation of *C. asiatica* in around 9 ha in 2011-2022.

6. *Desmodium gangeticum* (L.) DC.

Sarivan (Trade name)

Salparni (Hindi name)

Moorele honne (Kannada name)

Orila (Malayalam name)

Orilai (Tamil name)

Gitanaramu (Telugu name)



***Desmodium gangeticum* (L.) DC.**

Desmodium gangeticum is an annual/biennial subshrub growing a height of 1.2 m. This species is distributed from Africa to Australia, in India it is found throughout in forests and open mountain habitats. It is a widely recognized plant using against various ailments in home remedies such as, gastrointestinal, liver and jaundice disorders. Major therapeutic claims are hepato-protective, antipyretic and dermatitis. *D. gangeticum* is one among the 10 incredible roots used in the preparation of Dashmoola.

QPM Production and Cultivation

QPM Producer	Grower
 <p>Sri. S. Sabik Botanist, Ahalia International Foundation, Kozhippara, Palakkad Kerala - 678557 Phone: 9895615569</p>	 <p>Sri. Pratheesh 10/191, Uthradam Nivas, Kanyarpadam, Chittur, Palakkad, Kerala Phone: 8089997961</p>

Sri. S. Sabik, produced 15,500 QPMs of *D. gangeticum* in the nursery at Ahalia Campus, Palakkad, Kerala. Seeds of *D. gangeticum* were sown in mother beds of size 0.6 m × 1.8 m. After 7-10 days the germinated healthy seedlings were successfully potted in to the polybags. Within 45-50 days the QPMs were ready for supply.



QPMs of *D. gangeticum* in nursery at Ahalia campus, Kozhippara, Palakkad, Kerala

Sri. S. Sabik, supplied 13,000 QPMs of *D. gangeticum* to Sri. Prakatheesh (QPM farmer) for planting in his field at Polluly, Chittur, Palakkad, Kerala (Temperature 30-35 °C, annual rainfall 600 mm and loam to clay or loam soil, with pH 8.5 - 9.0).

QPMs of *D. gangeticum* was transplanted in the raised beds (2 m × 4 m; spacing: 0.45 m × 0.45 m) during July 2021. Before planting, the field was ploughed thoroughly using mini-tiller and applied farmyard manure. Irrigation was done weekly once up to 6 months. Weeding was carried out twice in a week.

The roots are mainly used in herbal industry and became ready to harvest in 18 months after planting. The entire plants were uprooted and roots were separated from aerial parts by cutting the stem just above the base. Collected stem and roots were washed properly and dried under sunlight for 10 days. Dried stem and roots were packed in gunny bags.



Field plantation of *Desmodium gangeticum* at Chittur, Palakkad, Kerala

From this crop, on a hectare basis, the estimated whole plant yield (dry weight) was 1,250 kg /ha. The market price of *D. gangeticum* was Rs. 96/kg and with a total gross income of Rs. 1,20,000/- and net income of Rs. 77,000/- per hectare. The cost of cultivation was Rs. 43,000/ha with a B:C ratio of 2.8. During cropping period of eighteen months, about 200 man-days of work per hectare were also generated.

Under this QPM project supplied by RCFC (SR) Sri. S. Sabik was able to promote 0.60 hectares of *D. gangeticum* during the year 2020-21.

7. Justicia adhatoda L.

Vasaka (Trade name)

Adusoge (Kannada name)

Aadalodakam (Malayalam name)

Adathodai (Tamil name)



Addasaramu (Telugu name)



***Justicia adhatoda* L.**

Justicia adhatoda is distributed in South and South-east Asia. In India, it is widely cultivated in tropical low elevation sites. The root, leaves and flowers are used in the form of juice and decoction to treat fever, intrinsic haemorrhage, cough, asthma, obesity, oedema, skin diseases, difficult labour, vomiting, piles, pox, retention of urine, diseases of mouth. A sweet prepared from *J. adhatoda* flowers called Vasaka Gulkand is used to treat tuberculosis.

QPM Production and Cultivation

QPM Producer	Farm Coordinator
 <p>Dr. I. Unnikrishnan Namboothiri Ittoozhi Illam Ayurveda Foundation, Charitable trust, Mayyil P.O., Kannur, Kerala- 670 602. Phone : 94474 59718</p>	 <p>Sri. Jobi Raghavan Coordinator, Kudumbashree District Mission, Kannur District, Kerala Phone: 7510142451</p>

Dr. I. Unnikrishnan Namboothiri, Mayil, Kannur produced 39,946 QPMs (stem cuttings) of *J. adhatoda* and supplied 37,300 QPMs to Kudumbashree Mission, Kannur District, Kerala for cultivation. Sri. Jobi Raghavan, Coordinator of the Kudumbashree Mission, Kannur District and Kudumbashree Women Group, Payyanoor Panchayath, Kannur planted them in a total of one-hectare land in Kannur District (annual rainfall 241 cm, mean temperature 26.4 °C).



QPMs of *Justicia adhatoda* (Cuttings) in a Nursery at Mayyil, Kannur, Kerala

The land was made into long ridges and the rooted stem cuttings (with at least 5-10 leaves) were transplanted in the field (ridges) at a spacing of 60- 90 cm between two plants during the rainy season (June-July). Organic manure with dried cow dung was used as basal compost. Regular weeding was done. As planting was done in during June-July (rainy season), separate irrigation was not done in the initial phase. However, during post-monsoon season, some plants showed the symptom of dryness and thus regular irrigation was done.



Field of *Justicia adhatoda* in Kannur District, Kerala

The leaves were harvested one year after planting. Each harvest required an interval of at least 3-4 months, and the roots were harvested after two years of field planting (during the December- January; alkaloid content is higher). The harvested stem was cut into 15 cm pieces, dried and stored. The harvested roots (by digging) were washed, cleaned and marketed.



Harvesting of *Justicia adhatoda* during December 2019 in the presence of NMPB- RCFC (SR) staff Harvested roots of *Justicia adhatoda*

The total yield of *J. adhatoda* leaves (fresh) and roots and mature stem was around 2,500 kg/ha and 4,500 kg/ha respectively. Cost of cultivation was Rs. 1,25,000 per hectare. Market price of both fresh leaves, and roots and mature stem was leaves was Rs. 40/kg. The gross income through the root, stem and leaf was Rs. 1,00,000 and Rs. 1,80,000 per hectare respectively. Thus, *J. adhatoda* gave a total gross income of 2,80,000 and net income of Rs. 1,55,000 per hectare. The B:C ratio of *J. adhatoda* cultivation was calculated as 2.24.

During the cropping period of 24 months generated about 240 man-days of work per hectare. According to the farmers, this *J. adhatoda* is suitable for intercropping with vegetables crops.

With the support of RCFC (SR), Kudumbashree Women Group, Payyavoor Panchayath, Kannur cultivated *J. adhatoda* in 1.01 ha during 2018- 2019.

Prepared by P. Dineshkumar, P. Chiranjeevi and C. A. Hubaib Hassan



8. *Mucuna pruriens* (L.) DC.

Velvet bean (Trade names)

Kavach, Kiwach (Hindi names)

Chinakee beeja, Nasagunni (Kannada names)

Naikkuruna, Naikorana (Malayalam names)

Ponaikkali (Tamil names)

Dolungundi, Doolagondi (Telugu names)



***Mucuna pruriens* (L.) DC.**

Mucuna pruriens is widely distributed in Tropical Asia. In India it is distributed throughout including Andaman and Nicobar Islands. It is an important medicine for treating male infertility, nervous disorders, difficult urination and rheumatic ailments. In Ayurveda, it is used to treat Parkinson's disease.

QPM Production and Cultivation

QPM Producer



Sri. D.S. Thiwari

Punya Bhumi Rural and Urban
Development Trust, Bachahalli Village,
Gundlupete, Chamarajanagar District
Karnataka-571111
Phone: 9449461074

Farm Coordinator



Sri. Mahadevappa

Bachahalli Village,
Gundlupete Taluk
Chamarajanagar District,
Karnataka
Phone: 9353041658

Sri. D. S. Thiwari produced QPMs of *M. pruriens* in his nursery at Bachahalli Village, Gundlupete, Karnataka. The initial lot of seed was obtained from the Indian Institute of Horticultural Research, Hesaraghatta, Bangalore. After that he multiplied the plants successfully in his nursery and obtained superior quality seeds. He supplied 5,000 superior quality seeds to Sri. Mahadevappa, a farmer at Bachahalli village, Gundlupete, Chamarajanagar (Annual rainfall 785 mm, mean annual temperature 26° C., Soil is slightly acidic with pH less than 7), for cultivating in his farmland.

On the month of July 2020 seeds were directly sown in the main field (spacing: 1 m × 0.75 m). Seeds were treated with fungicide before sowing to protect from soil borne diseases. Main field was ploughed enough to make the soil porous to facilitate germination and sprouting of seeds. Farmyard manure at the rate of 10 to 20 t/ha at the time of land preparation was applied to the field. Fortnightly irrigation during dry season and one irrigation per month was carried out during winter. For the better growth and higher productivity young vines were supported by pandal system using bamboo planks (1 m × 0.8 m distance). The crop is resistance to most pests and diseases. No inorganic fertilizers and chemical pesticides were used. Weeding was carried out one month after field planting.

The crop was ready to harvest within 4 - 5 months after sowing i.e., during November-December 2020. Mature pods were harvested to collect seeds. Pods were turn to greyish-brown in colour indicating maturity for collection. Normally 3-7 seeds were found in a pod. Pods were dried in the sunlight for 4-7 days and then seeds were dried in shade to reach approximately 7-8% moisture. Completely dried seeds were stored in gunny bags and covered with polythene to ensure moisture free.

An average yield of 2,000 kg of seeds (dry weight) were obtained from one-hectare land with a total gross income of Rs. 1,50,000 and net income of Rs. 1,00,000 per hectare. The market price of seed of was Rs. 75 per kg. The cost of cultivation was Rs. 50,000 per hectare, with a B:C ratio of 3.0. During cropping period of twelve months, crop generated about 120 man-days of work per hectare. Under this QPM project, Sri. D. S. Thiwari promoted the cultivation of *M. pruriens* in over 2 hectares of land in 2020.

Prepared by C. A. Akhil and P. Chiranjeevi



9. *Murraya koenigii* (L.) Sprengel

Curry leaves (Trade name)

Karibevu (Kannada name)

Kariveppila (Malayalam name)

Kariveppilai (Tamil name)



Kariveepaku (Telugu name)



***Murraya koenigii* (L.) Sprengel**

Curry leaf is a popular leaf-spice used in small quantities for their distinct aroma due to the presence of volatile oil and their ability to improve digestion. The curry leaf tree is native to India, Sri Lanka, Malesia, Bangladesh and the Andaman Islands. The leaves are widely used in Indian cookery for flavouring foodstuffs. Curry leaf is also used in many of the Indian Ayurvedic and Unani prescriptions. Essential oil from *M. koenigii* serves as an important part in soap making, lotions, massage oils, body fragrance, perfume oils, aromatherapy products, bath oils, facial steams, hair treatments, etc. Curry leaves reduce Cholesterol level, improve digestion, Hair growth, Eye health, Blood circulation and treat wounds. It also helps in treating dysentery, diarrhoea and constipation, relieves morning sickness and nausea, Good for diabetics and heart problems, dental problem, Reduce stress. 'Kalasakadi Kashayam' is herbal decoction made from curry leaf used to cure the constipation, fever and low digestion. 'Kaidaryaadi Kashayam' is used for the treatment of amoebic dysentery, indigestion and sprue syndrome.

QPM Production and Cultivation

QPM Producer	Farmer
 <p data-bbox="312 1300 488 1332">Dr. R. Chitra</p> <p data-bbox="152 1341 648 1437">Associate Professor, Horticulture College and Research Institute, Tamil Nadu Agricultural University, Coimbatore.</p>	 <p data-bbox="783 1295 1126 1326">Sri. M. Meenasundaran</p> <p data-bbox="712 1336 1199 1397">Chinnamanur Village, Utthamapalayam Taluk, Theni District, Tamil Nadu</p>

Dr. R. Chitra, Associate Professor, Tamil Nadu Agricultural University, Coimbatore Produced 2,000 QPMs of *M. koenigii* at TNAU nursery (Periyakulam, Tamil Nadu) and distributed to the farmer clusters. Sri. M. Meenasundaran, Chinnamanur Village, Utthamapalayam Taluk, Theni District, Tamil Nadu (Red sandy loam soils; the average temperature 31.13°C; Average rainfall 160.4 mm) received 1,500 QPMs of *M. koenigii* for cultivation.



Before planting, the field was ploughed 3- 4 times. Seedlings were transplanted (30cm x 30cm pit size; space between two plant is 120cm - 150cm) in the main field during April- May. Crops were managed by providing regular irrigation (once in 5 days), farmyard manure and cow dung. The first harvesting (leaves) can be after 1 year of field planting.

The leaves are harvested every four months in a year. After each harvest, the farmyard manure is mixed with soil for better yield. The total annual yield from one-hectare land is about 5,000 kg with gross income and net income of Rs. 1,60,000 and Rs. 1,08,000 respectively. With a total annual cost of cultivation is Rs. 52,000 per hectare the B: C ratio is 3.1.

With the support of RCFC (SR), Dr. R. Chitra promoted cultivation of *M. koenigii* in 0.75 ha land during the year 2022.

10. *Ocimum basilicum* L.

Common basil, Sweet basil (Trade names)

Ban Tulsi, Jangli Tulsi (Hindi names)

Rama Tulasi (Kannada name)

Ramathulasi, Kattuthrithavu (Malayalam names)

Thiruneertupachilai (Tamil name)

Bhoo Tulasi, Komma Gaggiri (Telugu names)



***Ocimum basilicum* L.**

Ocimum basilicum, an erect herb growing up 60 cm height. The juice extracted from fresh leaves is a folk medicine to treat respiratory disorders, fever, ear pain, etc. The flowers of the plant are stimulant, carminative, antispasmodic, diuretic, and demulcent. Seeds are anti-dysenteric. The Juice obtained from leaf is antibacterial. The essential oil obtained from the plant is antibacterial, antifungal and insecticidal. The leaf and flower extract are used to treat acne, loss of smell, insect stings, snake bites and skin infections. It is also used in aroma therapy.

QPM Production and Cultivation

QPM Producer and Grower



ಕ್ರಮ ಸಂಖ್ಯೆ	ಔಷಧ ಸಸ್ಯಗಳ ಹೆಸರು	ಒಟ್ಟು ಸಸ್ಯಗಳ ಸಂಖ್ಯೆ
01	ರಾಮ ಚುಟುಕಿ (<i>Ocimum basilicum</i>)	40,000
02	ಕೃಷ್ಣ ಚುಟುಕಿ (<i>Ocimum tenuiflorum</i>)	40,000
03	ಅಜ್ಜಿಗಂಧ (<i>Withania somnifera</i>)	10,000
04	ಕಪ್ಪು ಅರಿಶಿನ (<i>Curcuma caesia</i>)	3,000
05	ಸುಗ್ಗೆ (<i>Moringa oleifera</i>)	2,000
ಒಟ್ಟು		95,000

ಸ್ರೀ. ಹೆ.ಕೆ. ಶ್ರೀನಿವಾಸ ಫೋನ್: 9986234955

Sri. H.K. Srinivasa
Haluvadi, Hebbakkavadi Village,
Kothathi Hobli, Lokshara (Post),
Mandya Taluk, Mandya District, Karnataka.
Phone: 9986234955

Sri. H. K. Srinivasa produced 34,500 QPMs of *O. basilicum* in his nursery at Haluvadi, Karnataka using seeds procured from Phalada Agro-Research Foundation, Bangalore and supplied to farmers for cultivation after multiplication. He also cultivated *O. basilicum* in his farmland (Annual rainfall 700 mm, mean annual temperature 24.0° C., Soil red sandy loams and acidic with pH 6.8) in open space and as an intercrop in coconut plantation.

Seeds of *O. basilicum* were sown in mother bed of size 3 m x 1 m in May 2022. Before sowing, mother bed was prepared by ploughing and followed by farmyard manure application. Watering was done on alternate days using sprinkler.

Seed germination was completed in 8-9 days after sowing. Thirty days old seedlings were uprooted and transplanted in the main field. The crop was managed under irrigation and Jeevamruth (slurry made up of water, cow urine, cow dung and jaggery) and farmyard manure was also applied. The first weeding in the field was done 15 days after planting. Farmyard manure and Jeevamruth were provided after each harvest of leaves. Inorganic fertilizers and pesticides were not used.



Ocimum basilicum farm at Haluvadi, Hebbakkavadi village, Kothathi Hobli, Lokshara (Post), Mandya Taluk, Mandya District, Karnataka

The leaves mainly used in herbal industries, became ready to harvest in 30-40 days after field planting. Leaves were harvested nine times in a year. Harvested leaves were sun-dried the same day, followed by 3 days of shade drying in a shed. Dried leaves were packed in moisture proof white bags. Thus, the dry leaves could be stored for about one year without any damage.

During each harvest, about 1,000 kg (dry weight) leaves could be harvested from one hectare with a total gross income of Rs. 76,500 - 1,000,00/ha. Thus, total income per hectare per year was Rs. 7 to 9 lakhs with cost of cultivation of about Rs. 1.15 lakhs. With a B:C ratio of 7.8, *O. basilicum*, during cropping period of twelve months, generated about 225 man-days of work per hectare at Rs. 300 per person per day.

Under this QPM project, Sri. H. K. Srinivasa promoted the cultivation of *O. basilicum* over 5 ha in 2022.

11. *Ocimum tenuiflorum* L.

Tulsi (Trade name)

Baranda, Kalatulas (Hindi names)

Tulasi, Sritulasi (Kannada names)

Krishnathulasi, Thulasi (Malayalam name)

Alangai, Ari, Ceccai (Tamil names)

Krishna tulasi (Telugu name)



***Ocimum tenuiflorum* L.**

Ocimum tenuiflorum is a perennial herb, native to the Indian subcontinent and widespread as a cultivated plant all over the Southeast Asian tropics. Leaves, flowers, root, and stem are used by traditional medical practitioners as expectorant, analgesic, anti-cancer, anti-diabetic, antifertility, hepatoprotective, anti-asthmatic, antiemetic, hypotensive and anti-stress agent. Leaves are also used for religious ceremonies.

QPM Production and Cultivation

QPM Producer and Grower



Sri. Rajendra Shirol

Hulkoti-582101, Gadag District, Karnataka
Phone: 9448934730

Sri. Rajendra Shirol cultivated *O. tenuiflorum* in his farm at Kurthukoti, Gadag in Karnataka using seeds collected from his farm (the initial lot of which was obtained from the Central Institute of Medicinal and Aromatic plants, Bengaluru) and supplied to farmers for cultivation. He also cultivated *O. tenuiflorum* in his farm in open space (Annual rainfall 500 mm, mean annual temperature 34.0° C., Soil black cotton and slightly alkaline with pH 8).

Seeds of *O. tenuiflorum* were raised in nursery mother beds (size: 1 m x 4 m with 0.3 m height) during 1st week of June 2021. About 1.25 kg seeds were used for planting in a hectare. Before sowing, mother beds were prepared by ploughing and applied farmyard manure. Sprinkler irrigation was done on alternative days. Seedling was ready for field planting after 30 days (spacing of 1 m between each row and 0.3 m between each plant). No inorganic fertilizers and chemical pesticides were used. Weeding was carried out one month after field planting.

Leaves, for herbal industries, became ready to harvest in 40 days of after planting. At the initial stage (after 45 days of planting) one cropping was done (at 5 cm from ground level) to ensure the coppicing of crop. Thereafter leaves were harvested at every 40 days interval. Harvested leaves were sun-dried for 2-3 days and stored in white moisture-proof polythene bags. Leaves were harvested seven times in a year.



Ocimum tenuiflorum farm of Sri. Rajendra Shirol at Kurthukoti-582101, Gadag District, Karnataka

During each harvest, about 500 kg (dry weight) leaves were harvested from one hectare with a total gross income of Rs. 60,000 per hectare. Total income per hectare per year from seven harvest was Rs. 4,20,000. Cost of cultivation was Rs. 60,000 per hectare per year, with a B:C ratio of 6.5. During the cropping period of twelve months, about 200 man-days of work per hectare were generated. With the RCFC (SR) support, Sri. Rajendra Shirol produced QPM and promoted cultivation of *O. tenuiflorum* in six hectares during the year 2020-2021.

12. *Phyllanthus emblica* L.

Indian gooseberry, Amla (Trade name)

Amla (Hindi name)

Nelli (Kannada name)

Nelli (Malayalam name)

Nellikai (Tamil name)

Usiri (Telugu name)



***Phyllanthus emblica* L.**

Phyllanthus emblica is a small, deciduous tree growing in tropical and subtropical regions of India. The economic part of *P. emblica* is fruits and are used by drug industries. The fruits have great medicinal properties and one of the richest sources of Vitamin C. It is also used together with *Terminalia chebula* (Black myrobalan) and *Terminalia bellirica* (Bastard myrobalan) for making the famous 'Triphala Churna'. It is of great importance in traditional Asiatic medicine, not only as an antiscorbutic, but also in the treatment of diverse ailments, especially those associated with the digestive organs.

QPM Production and Cultivation

QPM Producer and Grower



Sri. N.M. Mahesh (on the left)

Survey No. 49/4, D. Nagenahalli village, Nagenahalli Taluk,
Tumkur District, Karnataka-572140,
Phone: 9741048653

Sri. N. M. Mahesh, produced 10,000 QPMs of *P. emblica* in his nursery at D. Nagenahalli village, Tumkur, Karnataka (Annual rainfall 700 mm, mean annual temperature 24° C, Soil red sandy loams and acidic with pH 6.8). The initial lot of seeds was obtained from the IIHR-Bangalore. After that he multiplied the plants successfully in his nursery at Nagenahalli Taluk, Tumkur, Karnataka and supplied to farmers for cultivation.

Seeds of *P. emblica* directly raised in polybags. Seeds were sown on May 2022, through dibbling in polybags at his 0.6 acres of open farm-land nursery. Main field planting was done on July-August (Spacing: 6 m x 6 m; pit size: 0.4 m x 0.4 m). The crop was irrigated initially for establishment. Drip irrigation was appropriate which can save water up to 40-45%. No irrigation was given during rainy and winter season. Manuring had done immediately after pruning. Trenches were made in the crop-land for proper rain water utilization.



QPMs of *Phyllanthus emblica* in nursery at D. Nagenahalli village, Nagenahalli Taluk, Tumkur District, Karnataka: ready to supply

Phyllanthus emblica plantation in D. Nagenahalli village, Nagenahalli, Tumkur, Karnataka

The Crop can only harvest after 6 years of planting. But, Sri. N. M. Mahesh was already having 20 years of old crop in his farmland. Hence, yield and economics were compiled from the earlier crop data.

According to Sri. N. M. Mahesh, the total cost of cultivation and tree management during a period of 6 years Rs.3,50,000 per hectare where, 500 trees are growing. During the sixth year, total yield of *P. emblica* fruits is 50,000 kg per hectare and with a total gross income of Rs. 7,50,000. Thus, the B:C ratio is 2.1. According to Sri. Mahesh, a total of 700- man days are required per hectare for planting, managing trees and harvesting fruits etc.

Under this QPM project, Sri. N.M. Mahesh by supplying QPM produced by him promoted the cultivation of *P. emblica* in over 3 ha in 2022.

13. *Piper longum* L.

Long pepper (Trade name)

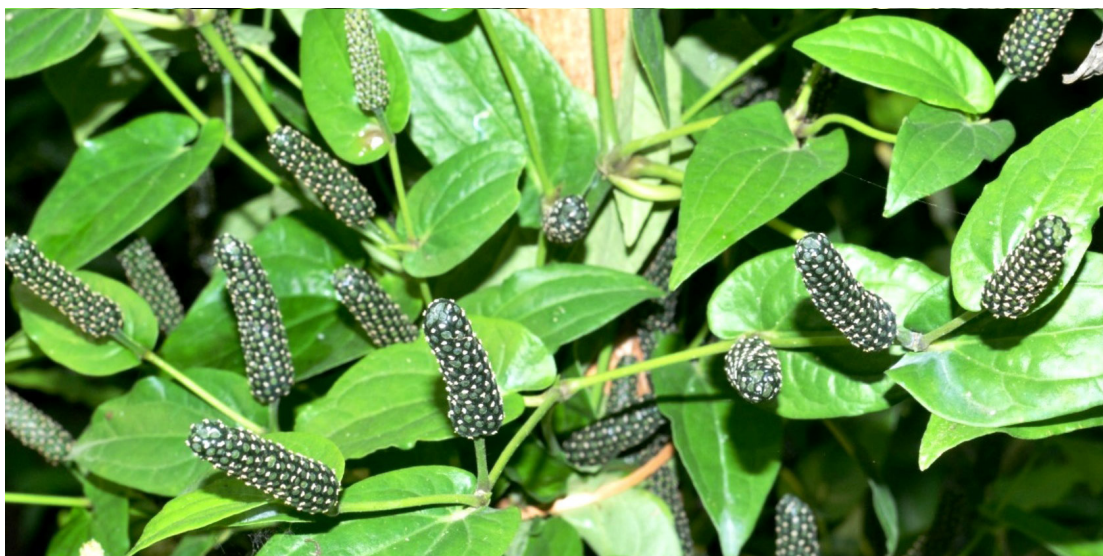
Pippali (Hindi)

Hippali (Kannada)

Thippali (Malayalam name)

Tippili (Tamil name)

Pippallu (Telugu name)



***Piper longum* L.**

Piper longum, a climbing perennial plant of South Asian origin, is cultivated for its fruits which are used as a spice and in the preparation of more than 320 herbal medicines. Long pepper has its origin in the Indo-Malay region. In India, it is cultivated in South Indian states, eastern Uttar Pradesh, Khasi hills and in lower hills of West Bengal. Long pepper is used for treating rheumatoid arthritis, liver disorders, tooth ache, insomnia, Alzheimer's disease, diabetes and respiratory problems.

QPM Production and Cultivation

QPM Producer and Grower



Dr. Jeddu Ganapathi Bhat

Chairman, Jeddu Ayurveda Vanaspathi Abhivridhhi Parishath, Padmagiri, Jeddu
Village: Alike- 574235, Bantwal Taluk, Dakshina Kannada District, Karnataka.
Phone: 9731807273

Dr. Jeddu Ganapathi Bhat obtained the stem cuttings of a high yielding variety (Viswam), of long pepper developed by the Kerala Agriculture University. He planted the stem cuttings in small polythene bags filled with potting mixture. The stem cuttings were gently pressed into the potting mixture using a small stick to ensure anchorage and production of roots from the nodes. The rooted plants became ready for planting in 3 months' time and they were transplanted in the field. The farmland is located in Vittal in Karnataka (average annual rainfall 3,500 mm, temperature 33°C, soil loamy, pH 6.5)

Usually, long pepper is cultivated in raised beds in areas with optimal light and water availability. However, Dr. Jeddu Ganapathi Bhat tried to cultivate long pepper

as a mixed crop in areca nut farm. He used areca nut trees as standards for the long pepper. About 2,000 to 3,000 kg of cow dung per hectare was applied. Pits, each of 50 cm³ were taken about 30 cm away from the base of trees. 750 rooted stem cuttings were planted in one-hectare area. The first harvest was done one year after planting. After harvest, fully matured ripe berries are properly dried, well packed and stored in chambers. Shelf -life of dried fruit was 10 months, thereafter weight reduces and affects the quality.

From a single plant, 2 kg of fresh ripe mature berries can be harvested in a year and that will yield 0.5 kg of dried fruits. Thus, the yield of long pepper is 375 kg dried berries per hectare per year. Long pepper is a high value medicinal crop and fetches about Rs. 500 per kg in the herbal market.

The cost for production of long pepper for the first year is Rs. 50,000 per ha. Total revenue from long pepper cultivation is Rs. 1,87,500 per year per ha. B:C ratio is 3.7 for the first year which suggests long pepper is a profitable crop. For the second and third year, since the cost of production is lesser compared to first year, B:C ratio will be more than 3.7.

With respect to labour, 40-50 labour days are required per hectare per year for pepper cultivation and management. Under the QPM project, Dr. Jeddu Ganapathi Bhat promoted the cultivation of *P. longum* in 4.8 ha of land in Vittal, Karnataka.

Prepared by C.A. Hubaib Hassan, P. Chiranjeevi and C.A. Akhil



14. *Plumbago indica* L.

Chitrak, Chitramool (Trade names)

Chitramulika, Chitramoola (Kannada names)

Kotuveli (Malayalam name)

Chenkotuveli (Tamil name)

Yerrachitramoolam (Telugu name)





Plumbago indica L.

Plumbago indica is a perennial herb or small shrub growing up to 1.0 – 1.5 m height erect, trailing or climbing stem. *P. indica* possesses a vast array of secondary metabolites. Among them, the most important chemical constituent is Plumbagin, which is chiefly present in its roots and is credited with potential therapeutic properties including anti-atherogenic, cardiotoxic, hepatoprotective and

neuroprotective properties. The roots of *P. indica* improve appetite and digestion, cure abdominal pain and piles, and pacify thridosha (vata, pitta and kapha), ease pains, sores, influenzas, and manage several kinds of skin diseases.

QPM Production and Cultivation

QPM Producer	Farm Coordinator
 <p data-bbox="196 805 625 962">Mattathur Labour Cooperative Society for local Development and Social Welfare Ltd., Mattathur PO., Thrissur, Kerala – 680684. Phone: 9747815009.</p>	 <p data-bbox="710 794 1219 925">Sri. T. G. Saseendran Thandassery (House), Pookode PO., Varakkara Thrissur District, Kerala - 680302. Phone: 9947457753</p>

MLCS has produced 10,500 QPMs of *P. Indica* in the nursery of Mattathur Labour Cooperative Society for local Development and Social Welfare Ltd. At Mattathur. Stem cuttings were planted 10 m × 1 m size in raised nursery beds. The Society supplied 6,000 seedlings to Sri. T.G. Saseendran, for planting in his field at Pookode PO., Varakkara Thrissur District, Kerala (Total annual rainfall 313 cm, mean annual temperature is 28.140 C. Soil red and slightly acidic, pH 6.5).

Seedlings were transplanted in June 2018 in raised beds (each of 0.6 m height x 1.5 m width × 5 m length). The space between two beds was 0.6 m. The rooted plants were transplanted at a spacing of 40 cm × 25 cm. Crop was managed by providing irrigation and farmyard manure. Inorganic fertilizers and pesticides were not used.

Plants attained maturity and ready for harvest in 12 months after planting. The field was made wet for easy harvesting. Plants were uprooted, dried, and the roots were cut into pieces of length 5 to 7.5 cm. The crop yield was 7,000 kg of dry roots per hectare area. The total gross income and net income per hectare is Rs. 6,30,000 and Rs. 4, 30,000 respectively, with a B:C ratio of 3.1. During the cropping period of 12 months generated about 350 labour days of work per hectare.



2-week-old plants of *Plumbago indica* in the field of Sri. T. G. Saseendran at Pookode, Thrissur District, Kerala

Plumbago indica plants at flowering stage in the field of Sri. TG. Saseendran at Pookode, Thrissur District, Kerala; ready for harvesting

With the support of RCFC (SR), Mattathur Labour Cooperative Society for local Development and Social Welfare Ltd., Mattathur PO., Thrissur, promoted cultivation of *P. Indica* in 5.0 ha land during the year 2018

15. *Pterocarpus santalinus* L.f.

Red sander (Trade name)

Rakta chandana (Kannada name)

Rakta chandanam (Malayalam name)

Sensantanam (Tamil name)

Erra chandanam, Rakta chandanam (Telugu names)



***Pterocarpus santalinus* L.f.**

Pterocarpus santalinus is endemic to Cuddapah, Chittoor, Kurnool and Nellore districts of Andhra Pradesh (India) and sporadically exist in some of its adjoining areas. Heartwood is used for treatment of the hiccups, intrinsic haemorrhage, menorrhagia, fracture, freckles, chronic fever, diarrhoea, spider poisoning and defects of vision.

QPM Production and Cultivation

QPM Producer and Grower



Dr. D. Murugaselvam

Seyyon Farms, Eechampatti Village,
Senthamangalam Taluk,
Namakkal District, Tamil Nadu
Phone: 9003166496

Dr. D. Murugaselvam, Seyyon farms, Namakkal District, Tamil Nadu, produced 2,320 QPMs of *P. santalinus* in his nursery 'Seyyon farms', from seeds obtained from the seed centre of Kerala Forest Research Institute, Peechi, Thrissur District, Kerala.

He supplied the QPMs to several farmers for cultivation. Dr. D. Murugaselvam, also planted the QPMs of *P. santalinus* in his farm (annual rainfall 770 mm, mean annual temperature is 28.3° C. Soil red sandy loams and acidic, Ph 7.2) in open space along with sandalwood, clove, pepper, and cardamom as intercrop.



Pterocarpus santalinus in the farm at Eechampatti Village, Senthamangalam Taluk, Namakkal District, Tamil Nadu



1-year old QPM of *Pterocarpus santalinus* plants of 60 to 65 cm height.

The seedlings of *P. santalinus* were transplanted in August 2018 in raised beds (40-meter-long, spaced at 3m) at a planting spacing of 3.5m x 3m. Crops were managed under drip irrigation. Farmyard manure and Panchagavya were provided three times after planting, at 4 months' interval. Inorganic fertilizers and pesticides were not used. Three years after field planting, *P. santalinus* flowered and produced fruits. After only 15 years, the tree is ready for heartwood harvest. Prior to that, between the third and fourteenth years, seeds are gathered from the trees once in a year.

On an average, 600kg (~4,50 seeds/kg) of *P. santalinus* were obtained from one hectare. Annual gross income and annual net income from per hectare from seeds is Rs. 8 lakhs and Rs.4 lakhs respectively, with the B:C ratio of 2.

The heartwood required for herbal industry is expected to be ready 15 years after planting.

Under this QPM project, a total area under *P. santalinus* cultivation by Dr. D. Murugaselvam and his associated farmers was 4.8 hectares

16. *Rauvolfia serpentina* (L.) Benth. ex Kurz

Sarpagandha, Indian Snakeroot (Trade names)

Candrabhaga, Nakulikanda, Sarpagandha (Hindi names)

Haavukannina gida, Shivanabhi, Sarpagandhi (Kannada names)

Amalpori, Sarpagandhi (Malayalam names)

Chivan melpodi, Sarpaganthi (Tamil names)

Dumparasna, Sarpagandha (Telugu names)



***Rauvolfia serpentina* (L.) Benth. ex Kurz**

Rauvolfia serpentina, a perennial shrub with thick root stock, is one of the important Ayurvedic medicinal herbs used as a sedative, and also for treating high blood pressure. The alkaloids, particularly, Reserpine derived from the root bark of *R. serpentina*, stimulate the central nervous system. Root is also used as anthelmintic and an antidote to snake venom. A decoction made out of this plant is given during labour pains as it improves uterine contraction. Leaf juice is used for the cure of corneal opacity of eyes.

QPM Production and Cultivation

QPM Producer	Farm Coordinator
 <p data-bbox="225 1166 618 1299">Sri. Y. Sivaram Prasad Penuganchiprolu Village, NTR District, Andhra Pradesh Phone : 8008907330</p>	 <p data-bbox="779 1166 1171 1299">Sri. G. Srinivasa Rao Penuganchiprolu Village, NTR District, Andhra Pradesh Phone.: 9441056602</p>

Sri. Sivaram Prasad collected the seeds of *R. serpentina* from Akansha Herbals, Bhopal. The seeds were soaked in normal water for 24 hours. Then the sunken seeds were collected and put them in jute bag, tied the bags tightly and kept for overnight. The mother beds of size 3 m × 1 m were prepared in the nursery and treated with Trichoderma and Pseudomonas. Then, the seeds were sown in mother beds. Watering was done on alternate days using rose-can. Seeds completed germination in 10-15 days. Three months old seedlings were uprooted and selected the QPM (seedling with 15 - 20 cm height with 4 - 7 pairs of leaves, 10 - 15 cm root length with straight growth).

Sri. Sivaram Prasad produced 70,000 QPMs of *R. serpentina* in his own nursery at Penuganchiprolu Village, NTR District, Andhra Pradesh and supplied them to Sri. G. Srinivasa Rao for planting in his field at Penuganchiprolu Village (Total annual rainfall is 974 mm, mean annual temperature is 40°C, soil sandy with pH 7).



Rauwolfia serpentina in QPM nursery of Sri. Sivaram Prasad at Penuganchiprolu Village, NTR District, Andhra Pradesh

The QPMs were transplanted in the main field on 28.01.2022. The crop was managed by providing irrigation and farmyard manure. The first weeding in the field was done after 30 days of planting. Inorganic fertilizers and pesticides were not used.

Under this QPM project, Sri. Sivaram Prasad promoted the cultivation of *R. serpentina* in 0.5 ha area during the year 2022.

R. serpentina is a biennial crop and Sri. Srinivasa Rao was not able to give the details of his crop. Thus, the details were collected from a farmer Sri. M. Sarath, Vinayakapuram Village, Bhadradi Kothagudem, Telangana who has cultivated *R. serpentina* in his farm (Total annual rainfall is 950 mm, mean annual temperature is 35°C, red soil with pH 7).



Rauvolfia serpentina crop in the farm of Sri. M. Sarath, Vinayakapuram Village, Bhadradri Kothagudem, Telanga
Mob.: 9398706440

Harvested plants and dry roots of *Rauvolfia serpentina*

According to Sri. Sarath, the estimated total yield (dry weight) of *R. serpentina* was 2,400 kg per hectare with a total gross income Rs.20,00,000 and net income of Rs.14,70,000 per hectare. The cost of cultivation was Rs.5,30,000 per hectare and thus, with a B:C ratio of 4.2, during cropping period of one year, also generated about 200-man days of work per hectare.

Prepared by P. Chiranjeevi and C. A. Akhil



17. *Salacia chinensis* L.

Saptrangi, Chinese Salacia (Trade name)

Baranda, Kalatulas (Hindi)

Ekanayaka (Kannada)

Cherukoranti, Ekanayakam (Malayalam)

Cuntan, karukkuvai (Tamil)

Nerani (Telugu)



***Salacia chinensis* L.**

Salacia chinensis is a woody climber, globally distributed in India, Sri Lanka, China, and Southeast Asia to New Guinea, and used commonly in Ayurveda. Fruits and roots are the most useful parts of this plant. Ripe fruits are edible. Roots have been used as a tonic, blood purifier and to treat various ailments like amenorrhea, dysmenorrhea, gonorrhoea, rheumatism and skin diseases. Few studies also demonstrated that, roots of *S. chinensis* are very useful in controlling type-2 diabetes, obesity- associated hyper-glycaemia, dyslipidaemia and related cardiovascular complications.

QPM Production and Cultivation

QPM Producer and Grower



Sri. Ganesh Shenvi Navrekar (on the right)
No. 3930, Rajashree Niwas, Main Road, Nandangadda, Karwar,
Uttar Kannada, Karnataka - 581304
Phone: 09448105381

Sri. Ganesh Shenvi Navrekar produced 15,000 QPMs of *S. chinensis* and distributed to farmers. His nursery is in Karwar, Karnataka (Annual rainfall 2983 mm, mean annual temperature 26.3^o C., Soil is lateritic and slightly acidic with pH less than 7). The initial lot of seed was obtained from the forestry college of Sirsi. After that he multiplied the plants successfully in his nursery and supplied to farmers for cultivation.

Mother bed was prepared (6 m x 1 m with 0.3 m height) by using 30 percentage farmyard manure, 30 percentage sand and 40 percentage of soil. Seeds were sown to mother bed in the month of May, and watering was done twice a day using sprinkler. The seeds started to sprout in June end and the growing seedlings were

maintained in the mother bed for 2 months. Later, the seedlings were uprooted, transplanted in different size polybags and distributed to farmers.

In the month of June-February, seedlings were planted in the main field. Before transplanting, main field was kept ready by ploughing and applying farmyard manure. Irrigation was provided by drip method. No inorganic fertilizers and chemical pesticides were used. Weeding was carried out one month after field planting. Weeding was required only for the first year of planting.



The crop can only harvest after 4 years of planting. But, Sri. Ganesh Shenvi Navarekar is already cultivating and marketing of *S. chinensis*. Hence, yield and economics were compiled from the earlier crop data provided by him. Roots and stems are used for herbal industries. According to Sri. Ganesh Shenvi Navarekar, around 10,000 kg (dry weight) root and around 20,000 kg (dry weight) stem can be harvested from one-hectare land.



Salacia chinensis planted in field

Per kg rate of dry root and dry stem of *S. chinensis* is Rs. 100 and Rs. 40 respectively. Total income per hectare from the root and from the stem is Rs. 10,00,000 and Rs. 8,00,000 respectively. Cost of cultivation for the first year is Rs. 2,50,000 per hectare and for the subsequent years is Rs. 75,000 per hectare. Thus, the total cost of cultivation is Rs. 4,75,000 per hectare for 4 years with a B:C ratio of 3.8. During the cropping period of 4 years, about 675 man-days of work per hectare is generated.

During the year 2022, under this QPM project, Sri. Ganesh Shenvi Navarekar promoted the cultivation of *S. chinensis* in 3 hectares.

Prepared by C. A. Akhil and P. Chiranjeevi



18. *Santalum album* L.

Sandal, Chandan (Trade names)

Safed Chandan (Hindi name)

Srigandha (Kannada name)

Chandana (Malayalam name)

Santanam (Tamil name)

Chandanam, Srigandham (Telugu name)



***Santalum album* L.**

Santalum album is a small tropical tree, and the traditional source of sandalwood oil. It is native to southern India and south-east Asia. The high value of the species has caused over-exploitation, to the point where the wild population is vulnerable to extinction. The natural occurrence of *S. album* is restricted to drier regions of peninsular India. It is also planted in many parts of the country. *S. album* has antiseptic properties against bacteria and fungi. It also has astringent, anti-inflammatory agent, expectorant hypotensive and aphrodisiac properties. Sandalwood oil is an important ingredient in aromatherapy, cosmetics, perfumes, and pharmaceuticals.

QPM Production and Cultivation

QPM Producer and Grower



Dr. D. Murugaselvam

Seyyon farms, Eechampatti Village, Senthamangalam Taluk,
Namakkal district, Tamil Nadu
Phone: 9003166496

Dr. D. Murugaselvam, Seyyon farms, Namakkal (District), Tamil Nadu, produced 10200 QPMs of *S. album* in his nursery in Seyyon farms, from seeds obtained from his own farm Eechampatti Village, Senthamangalam Taluk, Namakkal district, Tamil Nadu. He supplied the QPMs to several farmers for cultivation. Dr. D. Murugaselvam, also planted *S. album* in his farm (annual rainfall 770 mm, mean annual temperature is 28.3° C. Soil red sandy loams and acidic, pH 7.2) in open space. He also cultivated *S. album* along with red sandalwood fig, clove, pepper, and cardamom as intercrop.

The seedlings of *S. album* were transplanted in September 2018 in raised beds (40 m long rows, spaced at 3m) at a planting spacing of 3.5m x 3m. Crops were managed under drip irrigation. Farmyard manure and Panchagavya were provided three times after planting, at 4 months' interval. Inorganic fertilizers and pesticides were not used. Three years after field planting, the crop flowered and produced fruits. Seeds are gathered from the trees twice a year.



QPMs of *Santalum album* plants with a height of 30 to 35 cm



Santalum album plantation at Eechampatti Village, Senthamangalam Taluk, Namakkal District, Tamil Nadu

Annual production of seeds per hectare is around 787 kg (3,937,500 seeds). Annual gross income and annual net income from seeds when trees are 3-year-old were Rs. 15.74 lakhs and 9.44 lakhs respective. The cost of cultivation is Rs. 6.3 lakhs and thus, with a B:C ratio of 2.4. However, from fourth year onwards the gross income and net income per hectare per year from seeds are Rs. 16 lakhs and Rs. 13.5 lakhs respectively. With annual cost of cultivation of Rs. 2.5 lakhs, B:C ratio enhances to 6.4.

The heartwood required for herbal industry is expected be ready in 15 years. Under the QPM project, Dr. D. Murugaselvam and his associated farmers cultivated *S. album* in a total area of 4.8 hectares.

Prepared by M. Bharathiraja, P. Dineshkumar and P. Chiranjeevi



19. *Saraca asoca* (Roxb.) W.J.de Wilde

Ashoka, Sita Asoka (Trade names)

Ashoka (Hindi name)

Ashoka (Kannada name)

Ashokam (Malayalam name)

Ashokam (Tamil name)

Ashokapatta (Telugu name)



***Saraca asoca* (Roxb.) W.J.de Wilde**

Saraca asoca, a medium sized evergreen tree growing up to 15 meters in height with moderate fast growth, is an important medicinal plant used in the Indian Systems of Medicine. It grows in South Indian States, Orissa and Assam and also in central and eastern Himalayas. Ashoka is also a popular avenue tree. With multitude of medicinal properties and therapeutic uses, *S. asoca* has an apt Sanskrit name Ashoka, that is, the 'remover of sorrow'. It is also known as 'friend of women' as it is especially used in the management of menorrhagia and other female reproductive disorders. Though stem bark is the major raw drug, flowers and seeds are also medicinal. While flowers are used for treatment of haemorrhoids, dysentery, scabies in children and various other skin diseases, seeds are used for treating urinary discharges.

QPM Production and Cultivation



QPM of Ashoka were produced in the Central Nursery of Kerala Forest Research Institute, Peechi. The Oil Palm India Ltd. purchased 10,000 two-year old seedlings from KFRI and planted in 9 ha in Chithara and Yeroor Estates, Kulathupuzha, Kollam District, Kerala (Total annual rainfall is 1823 mm, mean annual temperature is 26.2^o C. Sandy loam soil and acidic).

In the month of June - July 2021, seedlings were planted in pits of size 60 cm x 30 cm in rows on either side of the farm road at a spacing of 3m x 3m. After transplanting, N: P: K was applied in the ratio of 1:1:1, weeding was done at regular intervals and irrigated during summer.

Ashoka is a long-term crop and thus, the beneficiary of the QPM (Oil Palm India Ltd., Kottayam) is not able to give details of crop yield and financial return. However, we are giving this information here from other sources. The stem bark is the major raw drug derived from *S. asoca*. Two methods are generally followed to collect the bark. In the first method, the tree will be felled at about 15 years of age at a height of 15 cm from the ground level. After tree felling, sufficient irrigation and fertilizers are provided to produce coppice of shoots, which can be harvested again after 15 years. In the second method, the bark can be collected without cutting down the tree. In this case, bark is removed from about ten-year-old trees. Here, the bark is peeled off in vertical strips with 6 cm interspaces between each strip. The peeled off area is renewed with fresh bark in 12 to 15 months. Then, the bark on the other areas can be peeled off without cutting the tree. This non-destructive method should be preferred for harvesting.

QPM Production Site





Stem bark should be harvested during October- November and dried immediately before storage to avoid microbiological contaminations and changes in the phytochemical composition.

In the long run, cultivation of *Saraca asoca* is profitable to farmers. It is estimated that Rs. 1,15,500/- per hectare will be the total cost of cultivation and management of crops for 10 years. When trees become 10-year-old, bark collection can be started. Subsequently, every year about 175 kg of dry bark can be obtained from one-hectare farm. At the rate of Rs. 150/- per kg of dry bark, annual income will be Rs. 26,250/-. That means, total income during 20 years of cultivation will be around Rs. 2, 62,500/- with a B:C ratio of 1.13.

20. *Sida alnifolia* L.

Bala (Trade name)

Sahadevi (Hindi name)

Kallamgadale (Kannada name)

Kurunthotti (Malayalam name)

Chittamutti (Tamil name)

Athibala (Telugu name)



***Sida alnifolia* L.**

Sida alnifolia is the most preferred botanical source of 'Bala' in Kerala State. This subshrub, with strong and stout roots and stems, has multitude of medicinal properties. In the Ayurvedic system of medicine, it is used as anti-rheumatic, analgesic, antipyretic, anti-asthmatic, nasal anti-congestant, antiviral, laxative, diuretic, aphrodisiac, hypoglycaemic, hepatoprotective and in the treatment of Parkinson's disease. Sida is chiefly used to treat rheumatism and to impart strength. It is one of the components of 'Chyavanprash', which is a popular Ayurvedic preparation widely used as tonic in improving health and immunity booster

QPM Production and Distribution

QPM Producer	Farm Coordinator
 <p data-bbox="179 654 609 809">Mattathur Labour Cooperative Society for local Development and Social Welfare Ltd., Mattathur PO., Thrissur, Kerala – 680684. Phone: 9747815009.</p>	 <p data-bbox="728 654 1163 818">Sri. T.G. Saseendran Thandassery (House), Pookode PO., Varakkara Thrissur District, Kerala - 680302. Phone: 9947457753</p>

MLCS has (Mattathur Labour Cooperative Society for Local Development and Social Welfare Ltd., Thrissur, Kerala) produced 30,59,000 QPMs of *S. alnifolia* in the Society's nursery and distributed to farmers' clusters. Sri. T. G. Saseendran, Pookode PO., Varakkara Thrissur District, Kerala obtained 70,000 QPMs of *S. alnifolia* from MLCS for cultivation.

For field planting, the land was ploughed to a fine tilth, and weeds were removed. The bare-root seedlings were transplanted in the standard beds (120 cm x 60 cm) at a spacing of 40cm x 40cm. Regular weeding and hoeing were done at an interval of 20-30 days. Farmyard manure/ vermicompost was applied at the time of planting. Irrigation was provided during summer.



The plants were harvested eight months after field planting. The field was made wet for easy harvesting. Plants were uprooted and the root portion along with about 20 cm stem portion were cut, washed, cleaned, and dried in shade. The dried produce was packed in gunny bags and stored under dry conditions.

The dry weight yield of roots was around 1,000 kg per ha. The cost of cultivation was around Rs. 80,000 per hectare with a net income of Rs. 1,20,00 per hectare and an average B: C ratio of 1.5. In a year total 60 man-days of work generated per hectare. Under this QPM project, MLCS promoted the cultivation of *S. alnifolia* over 8.1 ha in 2022.



21. *Trachyspermum ammi* (L.) Sprague

Ajwain (Trade name)

Omakki, Ajamoola (Kannada)

Ayamotheakam (Malayalam)

Omum (Tamil)

Vamu (Telugu)



***Trachyspermum ammi* (L.) Sprague**

Trachyspermum ammi, known as Ajwain or carom seed is native of Egypt and is a popular seed spice crop in India. In India, it is mainly cultivated in Rajasthan and Andhra Pradesh.

T. ammi is an effective digestive aid. Active enzymes in *T. ammi* improve the flow of stomach acids, which can help to relieve stomach indigestion, bloating and gas. The plant can also be used to treat peptic ulcers as well as sores in oesophagus, stomach and intestines.

QPM Production and Cultivation

QPM Producer and Grower



Dr. Shyamrao Kulkarni

Department of Agronomy, College of Agriculture, Bheemarayanagudi,
Shahapura, Yadgir-585 287, Karnataka
Phone : 9449289710

T. ammi is propagated through seeds. Dr Shyamrao Kulkarni bought 20 kg *T. ammi* seeds (variety - Kurnool local) for his QPM project from Andhra Pradesh for cultivation in the farmland located at College of Agriculture, Raichur, Karnataka (average annual rainfall 730 mm, mean annual temperature 34°C, black soil, pH 8).

Seeds were dibbled in the field in the month of August, at a spacing of 30 cm x 10 cm. Moderately cool and dry climate of the locality favoured good plant growth and flowering. Dr. Kulkarni cultivated *T. ammi* as entirely rain-fed. Cultivated as intercrop in 2-year-old *Melia dubia* plantation as well as open field. Weeding was done in the initial stage of plant growth. Only organic manures were applied.

The Crop was harvested 4 months after sowing. The harvested crop was stacked for drying, and then threshed to separate the fruits by beating with sticks. *T. ammi* yield was 500 to 750 kg dry seeds per ha. Open storage and sun drying was done as a post-harvest management practise. Shelf life of properly dried seeds is about 2 years.



Trachyspermum ammi cultivated as intercrop in 2-year-old *Melia dubia* plantation at College of Agriculture, Shahapura, Yadgir, Karnataka

The planting material of *T. ammi* costed Rs. 400 per kg. Total cost of cultivation for Ajwain was Rs. 20,000 per ha. Total revenue of cultivation was Rs. 60,000 per ha. Therefore, B:C ratio comes to 3:1 which suggests that *T. ammi* is a profitable crop.

Market price of *T. ammi* varied between Rs. 80-100 per kg. Labour is required only during sowing and harvesting. For a single season, 60 labour days were required for Ajwain cultivation per ha. Under the QPM project, Dr. Kulkarni and associated farmers cultivated *T. ammi* in 8.1 ha land.

Prepared by C. A. Hubaib Hassan and P. Chiranjeevi



22. *Withania somnifera* (L.) Dunal

Ashwagandha (Trade name),

Asgandh, Chirpotan, Punir (Hindi names)

Ashvagandha, Hiremaddina gida (Kannada names)

Amukkuram (Malayalam name),

Karappaanthazhai, Amukkuram (Tamil name),

Asvagandhi, Dommadolu (Telugu name)



***Withania somnifera* (L.) Dunal**

Withania somnifera is a perennial herb. Roots of this plant are used to prepare medicines to treat polyarthritis, rheumatoid arthritis, lumbago, painful swellings, diabetes, spermatorrhea, asthma, leukoderma, general debility, sexual debility, amnesia, anxiety neurosis, scabies, ulcers, marasmus and leucorrhoea.

QPM Production and Cultivation

QPM Producer and Grower



Sri. Rajendra Shirol

Hulkoti-582101, Gadag District, Karnataka
Phone: 9448934730

Sri. Rajendra Shirol, a postgraduate in Agriculture, produced 1,50,000 QPMs of *W. somnifera* in his nursery at Gadag, Karnataka from seeds (Poshita variety) procured from Central Institute of Medicinal and Aromatic Plants (CIMAP), Bangalore. He supplied the QPM to many farmers to cultivate. He also cultivated *W. somnifera* in his farm in open space (Total annual rainfall is 500 mm, mean annual temperature is 34° C., black cotton soil, slightly alkaline with pH 8).

Seeds of *W. somnifera* were directly sown in open field on first week of August 2022 (10 seeds per square feet). Before sowing, field was ploughed thoroughly

using mini-tiller, and applied farmyard manure. *W. somnifera* is an arid rain-fed crop, and hence irrigation was not needed. It was completely organic farming with zero usage of inorganic fertilizers and pesticides. Also, there were no serious pest issues for the crop.



Withania somnifera farm at Hulkoti, Gadag District, Karnataka

The roots are mainly used in herbal industry and became ready to harvest in 4 to 4.5 months after planting. Before harvesting, fruits were collected and threshed to obtain seeds for planting in the next season. The entire plants were uprooted and roots separated from aerial parts by cutting the stem 1 - 2 cm, above the base. Roots were dried for 10 days continuously under the sun after that it packed in white polythene bags.

An average yield of 625 - 750 kg of root (dry weight) were obtained from one-hectare land. The cost of cultivation ranged from Rs. 20,000 to 25,000 per hectare with an average revenue of Rs. 92,500 to 1,12,500 per hectare with an average B:C ratio of 4.5. In a year total 250 man-days of work generated per hectare. Under this QPM project, Sri. Rajendra Shirol promoted the cultivation of *W. somnifera* in over 35 ha land in the year 2022.

