
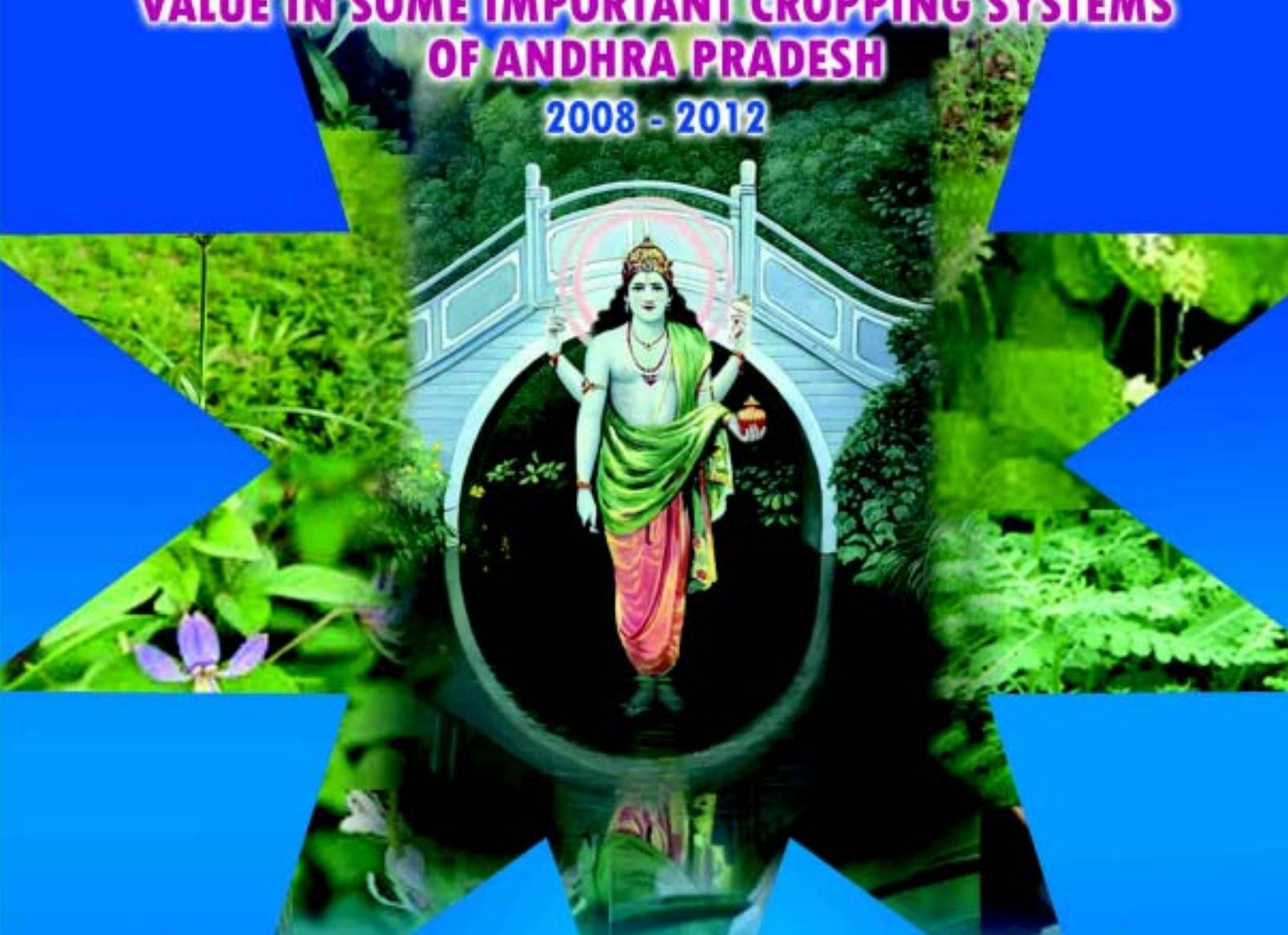



NAIP SUB-PROJECT COMPONENT - 4




UTILISATION OF WEED FLORA OF MEDICINAL VALUE IN SOME IMPORTANT CROPPING SYSTEMS OF ANDHRA PRADESH



2008 - 2012





COLLEGE OF PHARMACEUTICAL SCIENCES
ANDHRA UNIVERSITY
VISAKHAPATNAM - 530 003



RESEARCH PLAN

```

graph TD
    A[Plant collection] --> B[Processing for extraction]
    B --> C[Plant Extracts]
    C --> D[Bioactivity guided assays (In vitro and In vivo)]
    C --> E[LCMS Profiling]
    D --> F[Active Extracts]
    E --> F
    F --> G[Bioassay Guided Fractionation]
    G --> H[ENRICHED ACTIVE FRACTIONS]
    H --> I[Pure Compounds]
    I --> J[Bioactivity Assays (In vitro and In vivo) Determine IC50s]
    I --> K[Spectroscopic Analysis: NMR, LCMS, UV, FTIR]
    J --> L[Mechanistic Studies]
    K --> L
    L --> M[Identification of the Active Compounds]
    M --> N[NOVEL?]
    M --> O[DATABASE]
    O --> F
    O --> P[Intellectual Property]
    O --> Q[Scientific Validation of Ethnopharmacological Claims]
    
```

CONTENTS

No.	CONTENTS	Page No.
1	Sub-Project Profile	3
2	Introduction	4
3	Objective of the Project	4
4	Detailed Programme	4
5	Work Plan	7
6	Activities and Activity Milestones	8
7	Innovation	9
8	The Outputs	9
9	Expected outcomes and impact of the project	9
10	Consortium Advisory Committee (CAC)	10
11	Consortium Implementation Committee (CIC)	10





10 Consortium Advisory Committee (CAC)

S.No.	Name and Address	Designation	Phone Nos.
1.	Dr. V.M.Bhan , Ex-director, NRC for weed Sciences 16-A, New Ramnagar, Jabalpur-482004, Madhya Pradesh	Chairman	0761-2460183
2.	Dr. Trinath Maharana , Ex-Head of Horticulture Department Orissa University of Agricultural Technology Flat No. 62/2392, Sathabdi Nagar, Bhubaneswar-751003, Orissa	Expert Member	0674-2560270 09437025612
3.	Dr. Pulok.k.Mukherjee , Director, School of Natural Product Studies, Jadavpur University, Department of Pharmaceutical Technology, P.O.Box-17008, Kolkata-700032, West Bengal	Expert Member	033-24298313 09433013170
4.	Dr. A. Bandyopadhyay , National Coordinator Component-4 of NAIP/ICAR, New Delhi-110 012	Ex-Officio Member	011-25848710
5.	Prof. Beela Satyanarayana , Vice-Chancellor Consortium Leader (CL), Andhra University	Ex-Officio Member	09849582103 0891-2755547
6.	Prof. B. Ganga Rao , CPI Andhra University	Member Secretary	0891-2526143 09985022001

11 Consortium Implementation Committee (CIC) :

S.No.	Name and Address	Designation	Phone Nos.
1.	Prof. Beela Satyanarayana , Consortium Leader Vice-Chancellor, Andhra University	Chairman	09849582103 0891-2755547
2.	Dr. P. Rajeswara Rao , CoPI, Professor AU College of Pharmaceutical Sciences, Andhra University	Member	0891-2575513 09440557094
3.	Dr. D.Venkata Rao , Retired Professor AU College of Pharmaceutical Sciences, Andhra University	Member	0891-2530235 09490132303
4.	Dr. M.Venkaiah , CoPI, Professor, Department of Botany College of Science & Technology, Andhra University	Member	0891-2532385 09849639190
5.	Dr. NAV Prasada Reddy , CoPI Professor, Academic Staff College, Andhra University	Member	0891-2506596 09010832279
6.	Dr. M. Bharatha Lakshmi , CoPI, Principal Scientist Agronomy, Regional Agricultural Research Station	Member	08924-223370 (O) 09866223320
7.	Dr. A. Subrahmanyeswara Rao , CoPI, Principal Scientist, Agronomy Regional Agricultural Research Station	Member	0863-2524017 099593473
8.	P.V.G.D. Prasada Reddy , Registrar, Andhra University	Senior Administrative Officer, Member	0891-2844866 (O) 0891-2567845 (R) E-mail : prasadreddy.vizag@gmail.com
9.	Sri P. Prasada Rao Finance Officer Andhra University	Senior Finance Officer, Member	0891-2844166 09440794269
10.	Prof. Ganga Rao Battu , CPI AU College of Pharmaceutical Sciences, Andhra University	Member Secretary	0891-2526143 09985022001

1 Sub-Project Profile

A. Consortium Team

a. Lead Centre

Andhra University, Visakhapatnam, Andhra Pradesh.

1. Consortium Leader

Prof. Beela Satyanaraya, Vice-Chancellor, Visakhapatnam.

2. Consortium Principal Investigator

Prof. B. Ganga Rao, AU College of Pharmaceutical Sciences, Andhra University, Visakhapatnam.

3. Co-Principal Investigator

Prof. P. Rajeswara Rao, AU College of Pharmaceutical Sciences, Andhra University, Visakhapatnam.

Prof. D. Venkata Rao, AU College of Pharmaceutical Sciences, Andhra University, Visakhapatnam.

Prof. M. Venkaiah, Department of Botany, College of Science and Technology, Andhra University, Visakhapatnam.

Prof. N.A.V. Prasada Reddy, Academic Staff College, Andhra University, Visakhapatnam.

b. Consortium Partner Institute

Acharya N.G. Ranga Agricultural University, Rajendra Nagar, Hyderabad, Andhra Pradesh

1. Consortium Partner

Dr. P. Raghava Reddy, Vice-Chancellor, ANGRAU, Hyderabad

2. Consortium Co-Principal Investigators

Dr. M. Bharata Lakshmi, Principal Scientist Agronomy, Regional Agricultural Research Centre, ANGRAU, Anakapalle.

Dr. A. Subrahmanyeswara Rao, Principal Scientist Agronomy, Regional Agricultural Research Centre, ANGRAU, Lam, Guntur.

B. Duration : 3 years and 3 months

C. Date of Start : 22-01-2009

D. Total Budget Out Lay : 256.70 Lacs



10



3



6



4



- > Identification of five weed species of commercial value.
- > Isolation of bio-active molecules and their variation at different growth stages
- > Bioactive molecules / derivatives will be identified
- > Pharmacologically validated bio-active molecules will be identified
- > Highly potent genotypes from each species and their chemotyping will be identifiedSimple, inexpensive drying/storage techniques at farm level will ensure minimum damage to the medicinal properties till collectors collect the material will be developed.

9 Expected outcomes and impact of the project :

- > An important bioresource which does not actually get much attention will be documented and this in turn, will give impetus to further efforts in conservation and utilisation of this resource
- > A novel source of additional income for the farmer with very little additional inputs will be opened up

8 The Outputs :

- 7 Exploring the possibility of identifying the novel bio-active molecules with specific activities from selected weeds of medicinal value; and identification of highly potent genotypes from each species and their chemotyping.

7 Innovation :

India has one of the richest medicinal plant cultures in the world. It is a culture that is of tremendous contemporary relevance because it can on one hand ensure health security to millions of people and on the other hand it can provide new and safe herbal drugs to the entire world. Current research in drug discovery from medicinal plants involves multi faceted approach covering Botanical, Pharmacognostical, Phyto-chemical, Pharmacological and Molecular techniques.

The herbs are grown on road sides, forests and in fields along with important crops. Rice (59.78 lakhs ha), Maize (7.25 lakhs ha), Ground nut (1.35 lakhs ha) among the food crops, Cotton (9.72 lakhs ha), Sugar cane (2.6 lakhs ha) and Chillies among commercial crops are the important crops grown in Andhra Pradesh under different ecosystems. Cultivation of these crops is associated with other plant species called weeds.

Weeds are treated as unwanted material in the crop fields as they are sharing the nutrients, water and other essential elements ultimately affecting the main crop. Many crop weeds are known to possess medicinal values. However, these weeds of medicinal value are not subjected to systematic Phyto-Pharmacological evaluation. If a systematic scientific approach is adopted, its acceptability enhances and promotes them as herbal drugs. The global market for herbal drugs is increasing day by day. As a consequence of that a lot of imbalance is being developed between supply and demand. Any attempt on weeds to explore their possible medicinal value is highly needed and preparing the scientific background for exploiting a natural bounty in a totally innovative way, is a welcome step.

The chemotypic variation and medicinal value of weed flora at different growth stages in food and commercial crops grown in different regions has not been studied much so far. Hence, the present investigation provides an opportunity to profile chemical and pharmacological properties. By studying the chemotypic variation on the best time of collection, processing and storage for further use.

A systematic study in the present project on the best collection time, processing and harvesting methods of weeds of medicinal values provide the best way for farmer friendly collection and valid report for further use with practically no investment.

3 Objectives of the Project :

1. Isolation of bio-active compounds from five common weeds used as medicinals in Indian systems of medicine from rice, sugarcane and cotton cropping systems of Andhra Pradesh.
- ii. Chemical identification of bio-active molecules and its derivatives
- iii. Validation of bio-active molecules
- iv. Selection of highly bio-active rich genotypes of the five identified species

4 Detailed programme :

1. Keeping in view to study the "Utilization of Weeds of Medicinal Value in some Important Cropping Systems of Andhra Pradesh" a technical programme is planned to achieve the objectives.
- For implementation of the project eight agroclimatic zones are selected with eight operational areas.

2 Introduction

Agricultural innovations and diffusion of new technologies are the important factors in the country's quest for food, nutrition, environmental security and enhancement of income and employment. Agricultural innovations and diffusion of new technologies are the important factors in the country's quest for food, nutrition, environmental security and enhancement of income and employment.





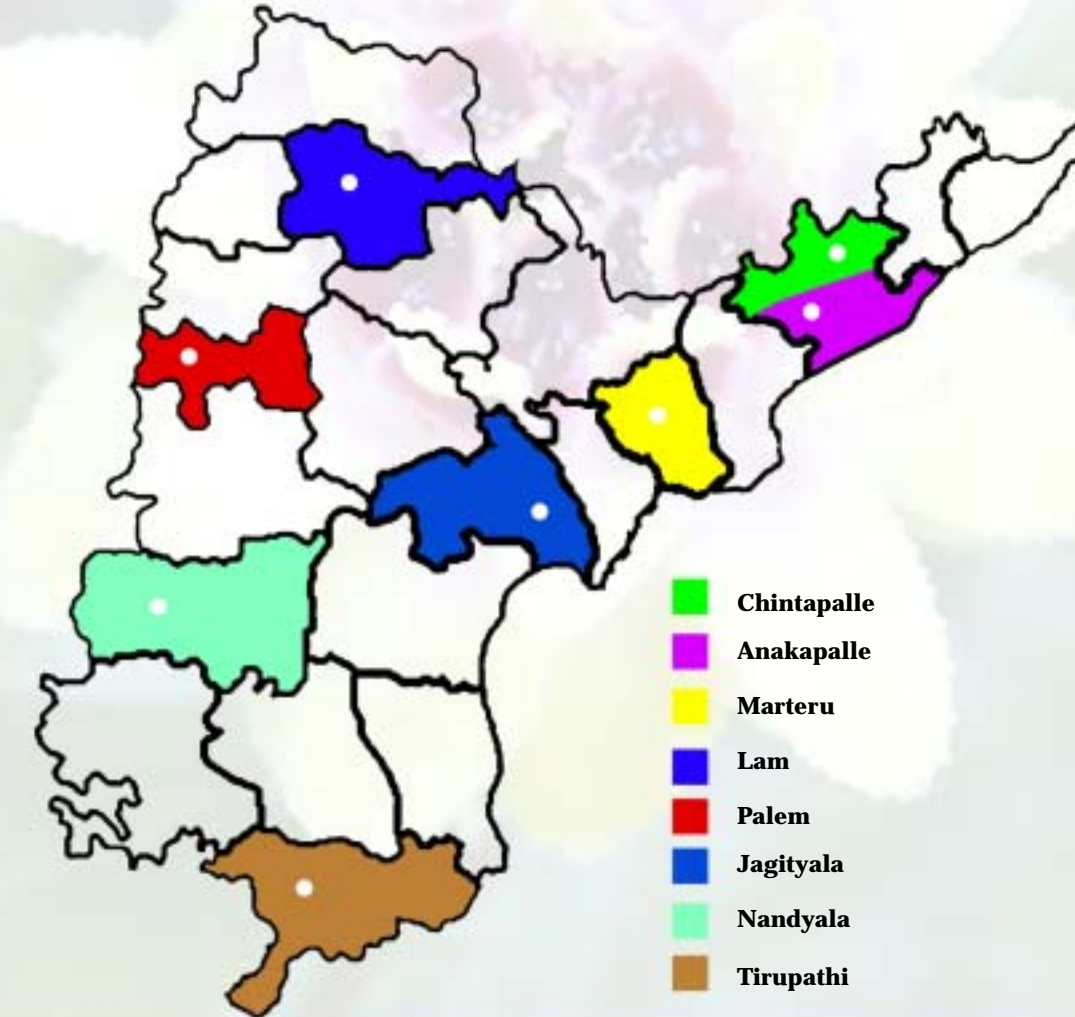
6 Activities and Activity Milestones :

Sl. No.	Activity milestones	Activity milestones	Milestone and when to be attained (years)				Outputs	Responsibility
			1	2	3	4		
1.	Isolation of bio-active compounds from five common weeds used as medicinal in Indian Systems of Medicine from rice, sugarcane and cotton based cropping systems of Andhra Pradesh	a. Identification of the five weed species on the basis of their demand as medicinal plants in the market; availability in commercially viable volumes and prior knowledge of their usages in curing diseases b. Bio-assay guided isolation of bioactive compounds at different growth stages of the weed growth in different cropping systems and different seasons.		✓			1. Identification of five weed species of commercial value. 2. Isolation of bio-active molecules and their variation at different growth stages	M V K , NAVPR, ASR and MBL
2.	Chemical identification of bio-active molecules and its derivatives.	1. Elucidation of chemical structure of bioactive molecules using spectral data			✓	✓	1. Bioactive molecules can be identified and structured.	BGR, PRR and DVR
3.	Validation of bio-active molecules	1. <i>In-vitro</i> and <i>In-vivo</i> validation of efficacy of bio-active compound (s) using appropriate test organisms	✓	✓	✓		1. Pharmacologically validated bio-active molecules will be identified	BGR and PRR
4.	Selection of highly bio-active rich genotypes of the five identified species	1. Selection of highly potent genotypes from each species and their chemotyping 2. Assessment of post-harvest handling techniques for preserving the medicinal properties of the identified weeds at the				✓	1. Highly potent genotypes from each species and their chemotyping will be identified	BGR, PRR and DVR ASR and MBL

MVK - M. Venkata Rao; NAVPR - NAV Prasad Reddy; ASR - A. Subrahmanyeswara Rao; MBL - M. Bharat Lakshmi; BGR - B. Ganga Rao; PRR - P. Rajeswara Rao; DVR - D. Venkata Rao.

a) Project area :

S.No.	Agro-climatic Zone	Operational area
1.	High altitude and tribal area	Chintapalli
2.	North Costal	Anakapalli
3.	Godavari	Marteru
4.	Krishna	Lam
5.	Southeren Telangana	Palem
6.	Northern Telangana	Jagityala
7.	Scarce Rainfalls	Nandyala
8.	Southern Zone	Tirupathi



8



5



7



9

5 Work plan :

- Farm level processing and storage techniques have to be studied to know the conditions acceptable by the various pharmaceutical companies and market agents.
- Establishment of shelf life of herbal drugs and quality standards have to be developed.

Objective 1 :

Isolation of bio-active compounds from five common weeds used as medicinal in Indian Systems of Medicine from rice, sugarcane and cotton based cropping systems of Andhra Pradesh

- Identification of the five weed species on the basis of their demand as medicinal plants in the market; availability in commercially viable volumes and prior knowledge of their usages in curing diseases
- Bio-assay guided isolation of bioactive compounds at different growth stages of the weed growth in different cropping systems and different seasons.

Objective 2 :

Chemical identification of bio-active molecules and its derivatives

- Elucidation of chemical structure of bio-active molecules using spectral data

Objective 3 :

Validation of bio-active molecules

- In-vitro* and *In-vivo* validation of efficacy of bio-active compound (s) using appropriate test organisms

Objective 4 :

Selection of highly bio-active rich genotypes of the five identified species

- Selection of highly potent genotypes from each species and their chemotyping
- Assessment of post-harvest handling techniques for preserving the medicinal properties of the identified weeds at the farm level.

b. Scientific Approaches to Attain the Objectives :

- Isolation and Identification of bioactive lead molecules and synthesis of semi synthetic derivatives/congeners for improving biological activities
- Scientific validation of bio-active molecules
- Best time, location and crop for collection (Best way for farmer friendly collection) and exploration of simple farm level processing techniques.

c. Status of Research in Solving the Problem :

The chemotypic variation and medicinal value of weed flora at different growth stages in food and commercial crops grown in different regions has not been studied much so far. Hence, the present investigation provides an opportunity to profile chemical and pharmacological properties. For example, *Cyperus rotundus*, the world's worst weed found in almost all crops as well as in fallow lands, is found to possess medicinal value which has not been studied systematically so far. The natural and rapid multiplication character of this weed can be exploited. Studies on chemotypic variation in plant *Artemisia annua* revealed that chemical component, artemisinin (a drug for cerebral malaria) and against chloroquine resistant *Plasmodium falciparum* is present in highest concentration before flowering.

Study of chemotypic variation in different growth stages of the weeds of medicinal value will give valuable information on the best time of collection and processing for further use. It is well established that the pharmacological activities are directly proportional to the concentration of the drug present in a particular herbal drug. Therefore, study of pharmacological activities at different growth stages will also provide the information for best time of collection.

A systematic study in the present project provides valid report on best time of collection, processing and harvesting methods of weeds of medicinal values (Best way for farmer friendly collection) for further use.

Many studies have revealed that farmers can earn additional income by selling the different valuable parts of useful weeds in national and international drug markets and to herbal drug industries with the help of village level cooperative societies.

d. Research Gaps Identified :

With regard to weeds of medicinal value, the following are the major and critical research gaps that have to be filled:

- Chemical analysis of the weeds of medicinal value at different growth stages of the weed in different seasons has to be carried out to find out appropriate time of collection when the active principles available are at maximum levels.
- Pharmacological validation has to be carried out to find highly potent genotypes and their chemotypic in selected weed species.

