

CAZRI DEN NEWS

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From the Desk of Chairman, ENVIS - Jodhpur

At present, about 1 billion people in the world are affected on account of degradation of Deserts and desertification. Millions of acres of land lose their productivity every year and there is very little effort to restore them. The cause of desertification are often interconnected - deforestation, overgrazing, unscientific irrigation management, inappropriate farming etc. that lead to problems of salinity, alkalinity, water logging etc. Apart from population pressures and developmental activities like mining, urbanisation, introduction of exotic plants and animal; climate change is also posing serious imbalances in desert ecosystems.

The importance of restorative activities in the Deserts and the dry lands is now realised. In order to have a sound understanding, characterization of adverse environmental impacts of past actions is required. This enables to know about the casual chain of events that lead to desertification. Based on such scientific inputs strategies and methods for



restoration may be developed that minimise the adverse effects of current and future activities. The Environmental Information System (ENVIS) at Central Arid Zone Research Institute (CAZRI) is committed for providing environmental information to decision makers, policy planners, scientists and engineers, research workers, etc. all over the country on Desert and desertification aspects.

The ENVIS on desertification at CAZRI is now renamed as ENVIS on "Combating Desertification" thus emphasizing techniques, technologies and policies on mitigating impacts of desertification as well as containing spread of the deserts.

- Co-ordinator

The New ENVIS Team

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| 1. Dr. M. M. Roy- Chairman | 5. Mr. Tirth Das- Member Seceratry |
| 2. Dr. Suresh Kumar- Co-ordinator | 6. Dr. Ritu Purohit- Programme Officer |
| 3. Dr. R. S. Tripathi- Member | 7. Dr. Shweta Mathur- Information Officer |
| 4. Dr. Dipankar Saha- Member | 8. Mr. Akshay Bhardwaj- IT Assistant |

Prosopis juliflora R&D at CAZRI: Development of Value Chain of Value Added Products

Introduction

The history of first introduction of *P. juliflora* into India is about 165 years old. However, introduction of the species was first seriously attempted in 1878. Owing to its fast growth and draught hardiness, the species has been introduced in many parts of India and today the species is distributed from north-west to south from states of Punjab to Tamil Nadu and in east-west direction it is found from Kuchchh region of Gujarat to drier parts of Bihar. The domain of the species in arid and semi-arid tropical region is mostly in plains and valleys. It was declared a 'Royal Plant' in Rajasthan in 1940, being promoted as a useful and productive species for the arid zone.

Pods of *P. juliflora* are composed of an exocarp, fleshy mesocarp, fibrous endocarps and hard seeds. The mesocarp varies in taste from tart and bitter to the sweet preferred for human and animal consumption. Per hectare production of pods of the species is highly variable ranging from 1 to 8 t/ha/year. *P. juliflora* produces fruits every year and can be termed an 'unfailing crop' as they produce a greater yield of pods in years of below average rainfall but may produce low yields of pods in very wet years. Fruiting occurs twice in a year in India and this characteristic makes them very suitable as a source of food and/or fodder.

A project on "Value chain on value added products derived from *Prosopis juliflora*" was funded by National Agriculture Innovative Project (NAIP), a mega project of ICAR financed by the World Bank. This project was sanctioned to Central Arid Zone Research Institute, Jodhpur led consortium under production to consumption system (PCS; Component-II). The other partners of consortium were National Food Products (India), Jodhpur and Desert Environmental Conservation Association (DECO), Jodhpur. In addition to said partners, the sub-project had two very active voluntary partner's viz., Amrit Agro Industry, Basni, Jodhpur and Transtech Green Power Private Ltd., Chitalwana, Santhore. To implement the project four villages in

Jalore district viz., Lalpura, Sayara Dhani, Khanpur and Gajpura were selected because *P. juliflora* was in abundance there as woody thickets as also some good tree stands. The salient achievements of the sub-project are as under:

- The technology was developed and perfected to process *P. juliflora* pod based livestock feed. It has been commercialized also, though at a local scale. A long term replicated experimentation was conducted on lactating Tharparker cattle to study the impact of the *P. juliflora* pod based processed feed on their production and reproduction status by addressing a range of physiological and hemato-biochemical issues. The experimental results confirmed significantly increased milk yield of cattle fed on concentrate mixture containing *Prosopis juliflora* pods. However, the calving interval of the cattle fed on *P. juliflora* pod based feed was also extended. The results indicated that *P. juliflora* pod based feed had no adverse effect on health, reproduction and production of lactating Tharparker cattle.
- The technologies were also perfected to process *P. juliflora* pod based feed blocks. *P. juliflora* pods are palatable feeds and good sources of energy for ruminants due to their digestible carbohydrate content. They can replace costly part of the diet grains to make the concentrate feed cheaper.
- Technology was standardized, refined and perfected for highly value added human use product "Instant Juli Coffee", a coffee substitute. Physico-chemical characteristics of Instant Juli Coffee were more or less similar to conventional coffee (Coffee robusta) except that caffeine was present in very low quantity in Instant Juli Coffee. Roasting of *P. juliflora* pod mesocarp is the main process for processing Instant Juli Coffee and therefore, to know the exact roasting end point, a shade card was developed. Organoleptic evaluation of Instant

Juli Coffee revealed that best combination which gives same taste and aroma that of conventional instant coffee was 70% roasted mesocarp of *P. juliflora* pods, 10% chicory powder and 20% powder of conventional roasted coffee beans.

- For commercial production of Instant Juli Coffee, food safety standards of *P. juliflora* whole pod powder and mesocarp were examined by NIN, Hyderabad. The acute and sub-chronic toxicity analysis test was conducted on mice using whole pod powder and mesocarp. Both the tests proved that the commodities are safe for human consumption.
- Public- private participatory model for up-lifting rural economy was developed. Transtech Green Power Limited, established an electricity generation plant at Chitlawana, Sanchore, district, Jalore (near to our target villages at Sanchore). The plant is a small scale unit, which is generating electricity using biomass. With CAZRI interventions a cooperative of farmers was formed to maintain sustainable supply of small *P. juliflora* twigs to power plant, which provided handsome additional income to the farmers.



Fig.1 Instant Juli Coffee

Developed Value Chain

The production technologies for livestock concentrate ration and feed block, and coffee substitute for human use is ready for commercialization. In fact, livestock concentrate is available in local markets in the brand name "Amrit Pashu Aahar" and "Kajari Pashu Aahar" processed by Amrit Agro Industry, Jodhpur and National Food Products (India), Jodhpur respectively. Process technologies for multi nutrient feed block, Prosopis seed gum, Anti-oxidant "Mesquitol", edible protein, exudate gum, nutritious syrup and fine Pod flour for use in confectionery items as a bio-leavening agent has been standardized. All these products are



Fig.2 *P. juliflora* based cattle feed production in factory

cheaper and easy to process into different commodities for livestock and human use. The developed value chain involved primary stakeholders, entrepreneurs, small scale industrialists, NGOs and research institution.

Simple Economics of Value Chain

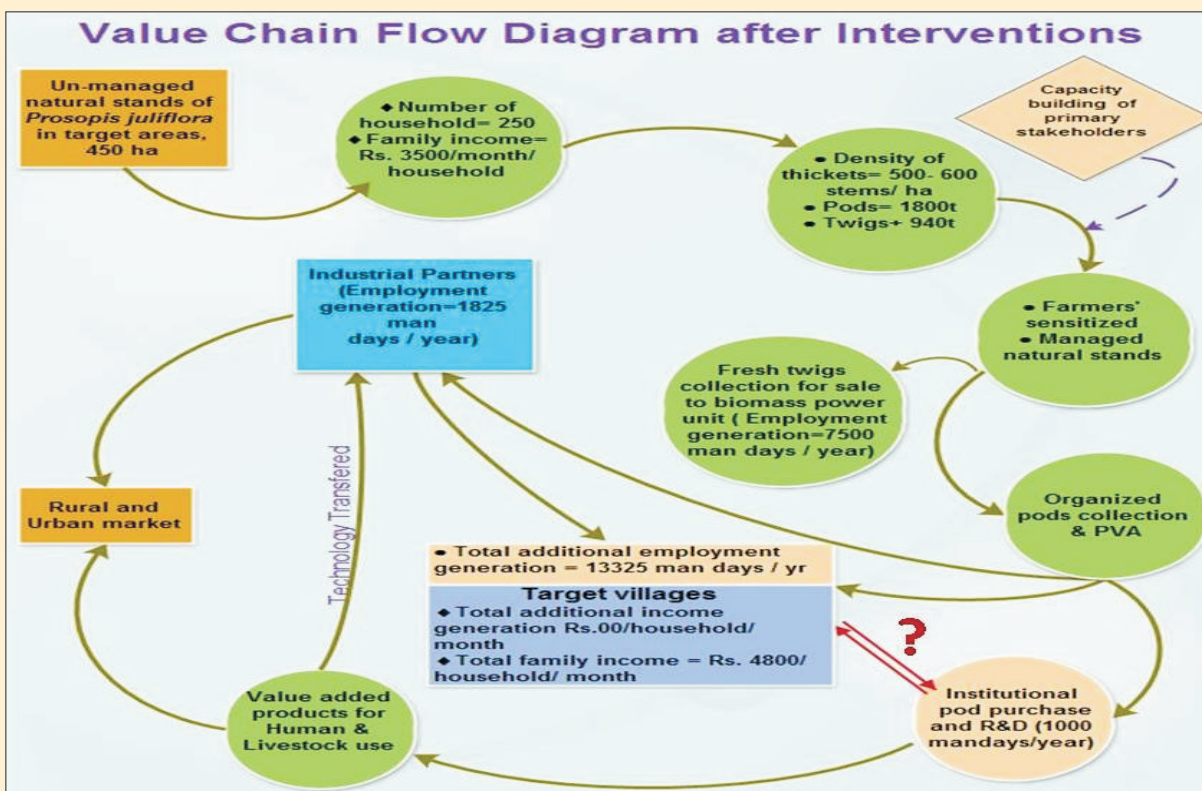
Present value chain is operating in 250 household involving four villages in district Jalore, Rajasthan. The primary stakeholders received additional employment to the tune of 4000 man days/ year through pod collection, grading and primary value addition, and selling fresh twigs of *P. juliflora* to biomass energy power plant. These man days provided additional income of Rs. 2400 per household per month. Thus, on an average, the income of each participating household increased by 68% in a year. Though the man days generated in biomass power generation plant are not directly related to the value chain and therefore, we did not include the earning of farmers' from this activity. As employment generated in selling the twigs and small branches of *P. juliflora* was 5400 man days year⁻¹, it



Fig.3 Procurements at Pod Collection Centre at Village Lalpuram, Sanchore

indicated that farmers' earned appreciable amount of income through this activity. Our linkage with biomass power generating unit provided great support to maintain the supply chain of *P. juliflora* pods to processing units at Jodhpur and providing sustainability to project activities. The processors generated employment to the tune of 1825 man

days year⁻¹ and earned an income of Rs. 6.90 million year⁻¹ with a net profit of Rs. 1.20 million year⁻¹. Thus, total value of present value chain is 9.30 million year⁻¹ excluding Rs. 1.5 million year⁻¹ earned by the villager through the sale of fresh *P. juliflora* twigs to biomass power generating unit. The value chain flow diagram after interventions is as under:



- J.C. Tewari, Pratibha Tewari, B.K. Mathur, Kamlesh Pareek and M.M. Roy

Conferences

International Conference on Water-Food-Energy Nexus in Drylands: Bridging Science and Policy

The OCP Policy Center in partnership with the Barcelona

Centre for International Affairs (CIDOB), King's College London and Texas A&M University is holding a conference about The Water-Food-Energy Nexus in Drylands on June 11-13

ENVIS Events

1. World Environment Day (5th June): Two eminent speakers Dr. G. Singh from AFRI and Prof. Pawan Kansera from J.N.V.U., Jodhpur delivered talks on the theme area of "Raise your voice, not the sea level".
2. World Day to Combat Desertification (17th June): Dr. K.D. Sharma, Ex. Member Technical, Water Resources, NRRP Planning Commission, Govt. of India delivered a talk on the theme area of "Ecosystem based adaptation to climate change".

Central Arid Zone Research Institute, Jodhpur 342 003, INDIA

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Editors : M.M. Roy, Suresh Kumar, R.S. Tripathi, Dipanker Saha and Tirth Das

Web: www.cazrienvis.nic.in E-mail: cazri-env@nic.in Fax: 0291-2788706 Phone: 0291-2786931