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# Van Sangyan

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**Tropical Forest Research Institute**

(Indian Council of Forestry Research and Education)

PO RFRC, Mandla Road, Jabalpur – 482021

# *Van Sangyan*

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## **Note to Authors:**

We welcome the readers of Van Sangyan to write to us about their views and issues in forestry. Those who wish to share their knowledge and experiences can send them:

by e-mail to [vansangyan\\_tfri@icfre.org](mailto:vansangyan_tfri@icfre.org)  
or, through post to  
The Editor, Van Sangyan,  
Tropical Forest Research Institute,  
PO-RFRC, Mandla Road,  
Jabalpur (M.P.) - 482021.

The articles can be in English, Hindi, Marathi, Chhattisgarhi and Oriya, and should contain the writers name, designation and full postal address, including e-mail id and contact number.

TFRI, Jabalpur houses experts from all fields of forestry who would be happy to answer reader's queries on various scientific issues. Your queries may be sent to The Editor, and the expert's reply to the same will be published in the next issue of Van Sangyan.

## From the Editor's desk

*In remote areas, many forest and tree foods make important contributions to household nutrition. Forest foods combine foods from plant and animal origin. Plant foods are often classified into fruits and seeds, nectars and saps, stems and tubers, leaves and mushrooms. Animal foods can be of invertebrate (insects and insect larvae) or vertebrate (bushmeat or fish) origin. Almost everything that is edible is consumed. Forest foods or "bush foods" are often associated with wild or non-cultivated plants and animals. The dichotomy between "wild" and "domesticated" is however often artificial as the analysis of local farming systems in forested areas world-wide shows a continuum from subsistence foraging to commercial agriculture. The dividing line between foraging and agriculture is, therefore, a thin one. Forest foods provide a wide variety of nutrients: carbohydrates, such as starches, fructose and other soluble sugars, protein, fats and micronutrients (vitamins and minerals). Different parts of the same species are consumed as food by different population groups. In many parts of the world, hunting still remains an important subsistence activity and bushmeat still provides a critical source of protein for both urban and rural populations. In Amazonia, indigenous groups living near large rivers acquire up to 85% of their dietary protein through fishing. Snails and rats may be eaten several times a week in some villages. Although neither forest nor tree foods are typically dietary staples, they do play an important supplementary role in the diet.*

*This issue of Van Sangyan contains an article on forest food and livelihood. There are also useful articles on cultivation of safflower, lac culture (in Hindi), social forestry in India, burma drek (*Melia composita* Willd.) – a suitable species for agroforestry, Traditional vis-à-vis mechanized sal leaf plate making, impact of soil and water conservation works of Bundelkhand special package, aromatic and medicinal plants (in Marathi), flowers as natural remedies, contribution and challenges of women farmers (in Hindi), trap cropping and biodiversity of *Cannabis sativa* (Bang) and *Bos mutus* (Yak).*

*I hope that readers would find all information in this issue relevant and valuable. Van Sangyan welcomes articles, views and queries on various issues in the field of forest science.*

*Looking forward to meet you all through forthcoming issues.*



**Dr. N. Roychoudhary**

Scientist G & Chief Editor

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## Forest food and livelihood (On World Food Day, October 16, 2015)

**Dr. Rajesh Kumar Mishra, Dr. Naseer Mohammad and Dr. N. Roychoudhury**  
Tropical Forest Research Institute  
Jabalpur



World Food Day was established by the member of Food and Agriculture Organization of the United Nations (FAO) countries at the organization's twentieth General Conference in November 1979. The date chosen - 16 October - is the anniversary of FAO's founding in 1945. On 16 October 1945, 42 countries acted in Quebec, Canada, to create the Food and Agriculture Organization of the United Nations (FAO). In doing so they took another important step forward in man's perpetual struggle against hunger and malnutrition. This year's World Food Day communications toolkit provides materials and suggestions for informing and engaging the public in social protection related activities. The theme of the World Food Day 2015 is "Social protection and Agriculture." which aims to underline the role social protection plays in reducing chronic food insecurity and poverty by ensuring direct access to food or the means to buy food. Social protection is,

moreover, a viable alternative for stimulating agricultural production and local economic activity.

In India **World Food Day** is celebrated in honour of the date of the founding of the FAO of the United Nations in 1945. It is also now considered as Food Engineers' Day.

The objectives of World Food Day are to:

- encourage attention to agricultural food production and to stimulate national, bilateral, multilateral and non-governmental efforts to this end;
  - encourage economic and technical cooperation among developing countries;
  - encourage the participation of rural people, particularly women and the least privileged categories, in decisions and activities influencing their living conditions;
  - heighten public awareness of the problem of hunger in the world;
  - promote the transfer of technologies to the developing world; and
  - strengthen international and national solidarity in the struggle against hunger, malnutrition and poverty and draw attention to achievements in food and agricultural development.

With an estimated increase of 105 million hungry people in the year 2009, there are now 1.02 billion malnourished individual across the world, viz. almost one sixth of

entire human race is suffering from hunger.

Despite the significance of agriculture as the major factor in the economies of many developing countries, this prominent sector is often starved of investment. In particular, foreign aid to agriculture has displayed drastic declines over the past 20 years.



At a time when the news is flooded with global economic crisis, the world needs to be jolted that not everyone is privileged to work in offices and factories. The small farms and rural areas of the world is the worst hit by this crisis and a huge percentage of hungry people live and work there.

Poverty and hunger are interlinked. And recent report from the Food and Agriculture Organization manifests that there are more than 1 billion people around the world who suffer from hunger every day. This report is not only alarming but also disheartening to think that while some of us waste food on the table, a big number of people have not a single chunk of food on their plate. This startling facts and poor situation among impoverished nations is the main concern of the entire world.

Many countries have witnessed the outbreak of hungry people every day with less opportunity to feed due to some of the basic factors like enhanced food prices and energy. Pakistan, Egypt, Morocco,

Cameroon, Malaysia, Ivory and Madagascar, Indonesia Coast, Ethiopia and many more countries have witnessed the same crisis at some point of time in their history.

Forests can play a vital role in supplementing global food and nutrition security. Tree-based farming provides resilience against extreme weather events, which can wipe out traditional food crops. The evidence shows that a large number of people still rely on the food from forests and trees to supplement their diet. Global estimates suggest that one-in-nine people are still suffering from hunger, and the majority of them are in Africa and Asia. Almost one-in-six people directly depend on forests for their food and income. It adds that in the Sahel region of Africa, tree-related production contributes an average of 80% to household incomes, particularly from shea nut production.

The fall in deforestation comes at a time when more wood than ever before is being used, as the global human population is more than one-third larger now than it was in 1990. This shows that sustainable forest management works and that political will and concrete action can make a difference. Today, forest management plans cover more than half of the global forest area.

Among the most pressing of the challenges facing humankind is feeding a global population projected to increase from over 7 billion today to over 9 billion by 2050. This challenge is made even greater by the threats of climate change, increasing water and land scarcity, soil and land degradation, and a deteriorating natural resource base.

We cannot meet the challenge without forests. They cover nearly one-third of the planet's land; are home to over 80 percent of the world's biodiversity, representing an

irreplaceable genetic resource for the future development of agricultural crops; and hold about three-quarters as much carbon as the Earth's entire atmosphere, thus mitigating climate change.

Over the last years we have been protecting our forests better. About 13 percent of the world's forests (more than half a billion hectares) are now designated primarily for biodiversity conservation, with Africa reporting the highest increase in the last five years.

There has also been a remarkable increase in the forest area covered by recent or ongoing national inventories – about four-fifths of the world's forests in 112 countries have initiated or conducted forest inventories in the last five years.

But much remains to be done. While in the last five years total forest area increased by 4 million hectares in Asia, 1.9 million hectares in Europe, 1.5 million hectares in Oceania and 0.7 million hectares in North America, it fell by 14.2 million hectares in Africa and 10.1 million hectares in South



America.

Moreover, sustainably managed forests can make major contributions to all SDGs. For example, forests are recognized in SDG 6, which aims to ensure the availability and sustainable management of water and sanitation for all. Forests can help protect and restore water-related ecosystems. To increase this contribution, we need to guarantee adequate incentives

to developing countries so that they can advance towards this management.

Millions of people also depend on forests to meet their food, energy and shelter needs. Wild foods from forests offer nutritious diets all year round, including in periods of hardship, and agroforestry – trees combined with agriculture – can increase the productivity of agricultural lands while diversifying diets. An estimated 2.4 billion people – about one-third of the world's households – rely on wood fuel for cooking.

Forests generate employment in rural areas, and they are the basis of millions of small enterprises that improve rural livelihoods. And they provide environmental services that are essential locally and globally. Forests support agriculture by keeping water catchments healthy, providing habitats for pollinators, and offering protection against climatic extremes.

Forests are therefore an irreplaceable part of sustainable development. We need to manage them better, with much greater integration with other land uses, including agriculture, and we need to ensure that their benefits are distributed equitably. And the results we are seeing show that we can do it.

We will not succeed in reducing the impact of climate change and promoting sustainable development if we do not preserve our forests and sustainably use the many resources they offer us. Committing to zero illegal deforestation would send a strong message in this direction. Together, we can make forests one of the great comeback stories of our time. We need this today and for our future generations.

Food from forests in India and elsewhere has much potential to address needs of

nutrition and food security at a time when the limits of boosting agricultural production are becoming increasingly clear. Many fruits and other crops from Indian forests are yet to be recognised as food but could help address the needs of



millions.

India relies mostly on agriculture, but that is subject to vagaries of weather. Forests can complement the agriculture-based strategy. Most of the forest foods are not in commercial production systems, but can be vital with sustainable harvesting.

Forest foods often provide a safety net during periods of food shortages. We reveal impressive examples which show how forests and trees can complement agricultural production and contribute to the income of local people, especially in the most vulnerable regions of the world.

The benefits of forests and trees to nutrition include the fact that tree foods are often rich in vitamins, proteins, and other nutrients and are associated with more diverse diets. We need to recognise the valuable contribution of forests to food in India and elsewhere. What keeps people hungry is often not the lack of food, but the lack of access to that food and control over its production. We need to recognize claims over food sovereignty which give local people greater control over their food.

There are an estimated 80,000 edible plant species on earth not counting the many edible varieties of each species. Most of these uncultivated foods are free, nourishing gifts of nature that grow in the wild and require no human labour, except in harvesting or gathering. Less than 150 plant species have been historically cultivated on a large scale as food crops. But with the spread of extensive industrial monocultures – grown with toxic chemicals for distant urban markets – barely 20 plant species now provide 90% of the entire human diet; and just 8 crops (of very few varieties) provide three quarters of all human food. That is a miniscule 0.01% (or one in ten thousand) of the edible species gifted by nature.

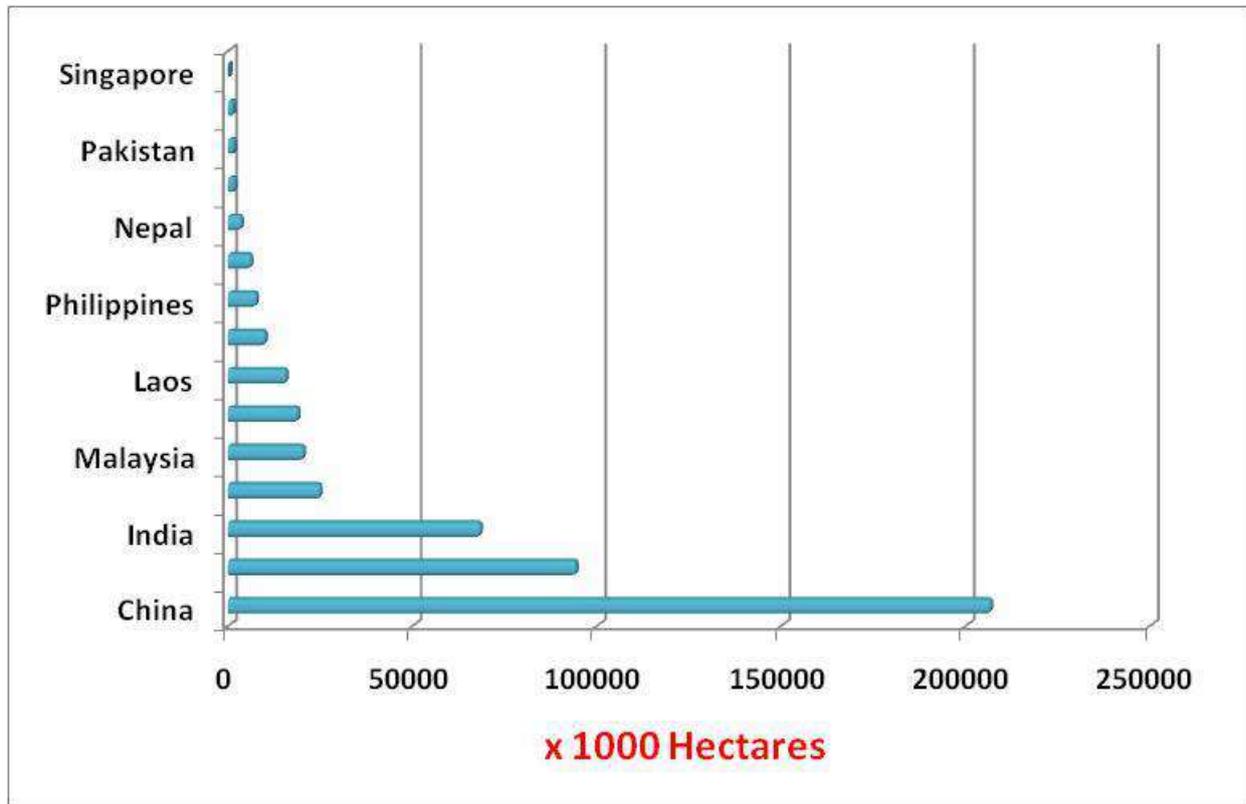
The rich natural inheritance of our forested regions sustained our Adivasi communities for generations beyond count. Today, if there are any people left on this earth who can teach our floundering ‘millennium generation’ the fine art and science of co-existing in harmony with the forest, it is these tribals. Or rather, just those among them now, who still retain the knowledge, the skills, and the native cultural perspective.

The World Health Organization estimates that more than 2 billion people in the world today suffer from micronutrient deficiencies, primarily in Asia and Africa. Micronutrients are nutrients the body needs only in small amounts like iodine, zinc, iron, and Vitamin A. They enable the body to produce enzymes, hormones, and other substances critical for proper growth and development of the body.

Researchers working with indigenous tribes in India said forest foods could provide a solution to micronutrient deficiency, a condition that has been termed “hidden hunger.” The forest foods

are the best available sources of micronutrients, which are available,

accessible, and affordable.



**Forest area in Asia (Source: UN global forest resource assessment, 2010)**

As the population in India has expanded and more people move to cities, the traditional sources of foods high in these micronutrients like leafy greens, fruits, and nuts are not as readily available.

In developed countries, staples like salt and wheat are often fortified with micronutrients like iodine and folic acid. While in developing countries where access to food, let alone fortified food, is not guaranteed, governments, NGOs and other organizations are looking at sustainable, nutrient-rich food systems to combat nutritional deficiencies.

The indigenous people who have sustainably harvested forest food for centuries can provide insight into how countries can do just that. As forests are cut down for agriculture and industrial

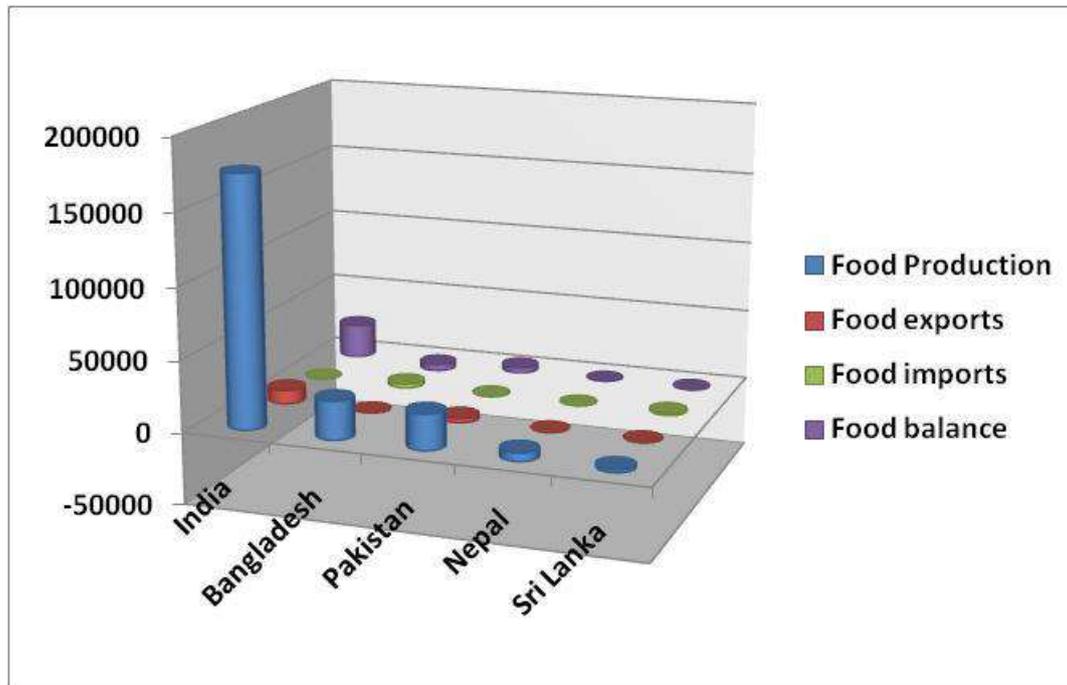
purposes, these people are being displaced and their knowledge lost.

So we are not only displacing unskilled, unorganized, rural people, (when forests are cut), we are actually displacing highly wise, knowledgeable people and after doing that, we bring them to the urban cities and then provide them subsidized food, which in our country is rice and wheat procured from 10,000 miles away, which is being grown with pesticides, burning fossil fuels etc.

Forest foods are also not as affected by natural disasters like drought, pests, and storms, which make them an important addition to conventional forms of agriculture. In addition to food, firewood for fuel, and pollinators like bees that are vital for agriculture are also threatened by deforestation.

We should recognize and conserve forests for the food and vital nutrients they

provide, not only as habitats for wild plants and animals.



**Food security in South Asia during 2002 (in 1000 metric tones)**

(Source: FAO, 2004)

Forests and trees contribute to a more productive environment which in turn leads to the production of more and better crops:

- Trees with deep rooting systems extract otherwise inaccessible nutrients from deep in the soil and bring them to the surface via leaf litter. This leaf cover enriches the surface soils for other plant varieties and helps retain moisture. Nitrogen fixing trees also contribute to soil fertility.
- Shade provided by trees lowers surface temperatures of soils which is generally beneficial to soil fertility for crop growth and provides protection for animals.
- Trees and shrubs planted and managed as wind breaks help control erosion, thereby improving soil quality and leading to increased agricultural production.

- Animal fodder collected from forests and trees often enhances meat and dairy production.

In many areas of the world however, traditional agricultural practices are still based on a shift-and-burn approach, which combined with demographic pressure can lead to the degradation of forest resources. With the increase in population and increasing use of natural resources by better-off farmers with access to a higher level of technology, there is a need for increased agriculture production to cover food needs, which could be obtained through intensification of the production system. Poor households however seldom have access to commercial production. The general understanding of the local population is that agricultural land for food production can essentially be gained through cutting down the forest.

Food insecure households are therefore likely to migrate whenever possible to forested areas in order to grow food, which will contribute to deforestation. About one in nine people globally still suffer from hunger with the majority of the hungry living in Africa and Asia. The world's forests have great potential to improve their nutrition and ensure their livelihoods. In fact, forests and forestry are essential to achieve food security as the limits of boosting agricultural production are becoming increasingly clear.

The benefits of forests and trees to nutrition are manifold. Tree foods are often rich in vitamins, proteins, and other nutrients and are associated with more diverse diets. Wild meat, fish, and insects are also important forest food sources. Insects are an especially cheap, abundant source of protein, fat, vitamins and minerals. Particularly in Southeast Asia, many forests and agroforests (tree-based farms) are managed by local communities specifically to enhance edible insect supply.

Forests are also essential for firewood and charcoal. In developing countries, 2.4 billion households use these renewable bio-fuels for cooking and heating. In India and Nepal, for example, even better-off rural households depend on wood fuels.

Trees offer a multitude of ecological services. For instance, they support bees and other pollinators, which are essential for crop production including on farmland. They also provide animal fodder that enables communities to produce meat and milk, and protect streams and watersheds as habitat for fish.

One out of six persons directly depends on forests for their food and income. In the Sahel region, for example, trees contribute 80 percent on average to household incomes, especially through shea nut production. Evidence also shows that worldwide the lower the level of prosperity, the higher the share of forests in household incomes.

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## झारखण्ड राज्य में कुसुम (Safflower) की खेती की सम्भावनाएं

एखलाक अहमद एवं अब्दुल माजीद अंसारी

क्षेत्रीय अनुसंधान केन्द्र (बिरसा कृषि विश्वविद्यालय),

चियाँकी पलामू - 822102 (झारखण्ड)

कुसुम (*Carthamus tinctorius* L.) एक बहु उपयोगी रबी तिलहनी फसल है। भारत वर्ष में कुसुम की खेती सदियों से इसके फूल की पंखुडियों में पायी जाने वाली प्राकृतिक नारंगी लाल रंग (कार्थेमिन) के लिए किया जाता रहा है, जिसका उपयोग खाने के रंग में, दवाईयाँ तथा बहुत सारी बीमारियों के इलाज में किया जाता है। पिछले



50 सालों से इसकी खेती मुख्यतः खाद्यान तेल के लिए किया जा रहा है जो कि हृदय रोगों के लिए उपयुक्त है, क्योंकि इसमें बहुतायत में Unsaturated fatty acid पाई जाती है, इसमें भी मुख्यतः linoleic or oleic acid पायी जाती है, जिसकी गुणात्मक तुलना जैतून के तेल से किया जा सकता है। प्रमुख रूप से इसकी खेती महाराष्ट्र, कर्नाटक, आंध्रप्रदेश आदि राज्यों में की जाती है। कुसुम झारखण्ड की परंपरागत फसल नहीं है परन्तु इसकी खेती के लिए यहाँ की

जलवायु उपयुक्त है। यही कारण है कि हाल के दिनों में इस फसल की खेती अत्यधिक क्षेत्र में करने पर जोर दिया जा रहा है।

कुसुम एसटरेसी (Asteraceae) परिवार में आता है। यह अधिक शाखा वाला शाकीय पौधा होता है। आम तौर पर इसकी बरानी खेती की जाती है। कुसुम के तेल को उत्कृष्ट तेलों की सूची में रखा गया है, साथ ही यह प्रोटीन का भी अच्छा स्रोत माना जाता है इसमें 40-45 प्रतिशत प्रोटीन पाया जाता है। इसके खली में भी पोषक तत्व की अच्छी मात्रा पायी जाती है। इसमें 5% N, 1.44% P, 1.23% K होता है तथा इसके छोटे पौधों को जानवरों के चारे के रूप में भी उपयोग किया जा सकता है।

### मौसम और जलवायु

यह मुख्य रूप से शीतकालीन (रबी) फसल है। इसके अंकुरण के लिए 15<sup>0</sup> - 20<sup>0</sup> से. तापमान की आवश्यकता होती है। मुख्यतया यह वर्षा आधारित फसल है। फूल आने के समय अधिक तापमान नुकसान दायक होता है। दिन का तापमान लगभग 30<sup>0</sup> - 32<sup>0</sup> से. फूल आने के समय उपयुक्त होता है। इसके बढ़वार के प्रत्येक अवस्था में अत्यधिक वर्षा, नम मौसम (Humidity), कुहासा हो जाने से कवक जनित

रोग का प्रकोप हो जाता है। बढवार के समय अत्यधिक जल जमाव से उपज में कमी आ जाती है। साधारणतया फसल अवधि में 60 से 90 मि. मी. वर्षापात उपयुक्त होता है।

### भूमि की तैयारी

इसके लिए दोमट और बालुई दोमट किस्म की मिट्टी उपयुक्त है। उच्च जल धारण क्षमता वाला खेत उपयुक्त होता है। pH मान 6 – 7 तक होना चाहिए। अच्छे अंकुरण और पौधा को उपयुक्त संख्या के लिए अच्छी जुताई की गयी भुरभुरी मिट्टी वाला खेत होना चाहिए, इसके लिए मिट्टी पलटने वाले हल से गहरी जुताई करना चाहिए, साथ ही दो से तीन बार हल से अच्छी तरह जुताई करने के बाद पाटा देकर खेत की तैयारी करनी चाहिए।

### खाद एवं उर्वरक

कुसुम की अच्छी उपज के लिए खेत में अच्छी तरह से सड़ी गोबर की खाद को 10-15 टन/हेक्टेयर अन्तिम जुताई के समय देना चाहिए। सिंचित अवस्था में रसायनिक उर्वरक 40:40:20 (नेत्रजन:स्फुर:पोटाश) किलो ग्राम प्रति हेक्टेयर की दर से बुवाई के समय व्यवहार करना चाहिए। सभी उर्वरक को मिला करके हल से बने नाली (फरों) में 8-10 से. मी. गहराई में देना चाहिए।

### बुवाई का समय

इसकी बुवाई के लिए अक्टूबर का प्रथम सप्ताह से नवम्बर का प्रथम सप्ताह उपयुक्त है। देर से बुवाई

करने पर फूल आने के समय तक तापमान अधिक हो जाता है। जिससे उपज में कमी आ जाती है।

### बीज दर

15-20 किलो ग्राम प्रति हेक्टेयर

### बीजोपचार

अच्छी किस्म का स्वस्थ बीज लेकर और उसे कैपटान/थीरम से 2-3 ग्राम प्रति किलो ग्राम बीज की दर से बुवाई के पहले करना चाहिए ताकि फफूंद जनित रोगों से बचाव किया जा सके।



### बोने की विधि

बुवाई हमेशा कतार में करनी चाहिए कतार से कतार की दूरी 45 से. मी. होनी चाहिए तथा पौधा से पौधा की दूरी 20 - 25 से. मी. पर होनी चाहिए। नालियों की गहराई 5 - 6 से. मी. होनी चाहिए। इसके लिए देशी हल या डचहो का उपयोग करना चाहिए। इन नालियों में पहले उर्वरकों की पूरी मात्रा मिला करके दें, बाद में बीजों को नालियों में डालें। बुवाई के समय खेत में पाटा चला दें। ध्यान रहे बुवाई के समय खेत में पर्याप्त नमी जरूर होनी चाहिए, इससे अंकुरण अच्छा होता है।

### उन्नत प्रभेद

ए. - 300 यह किस्म 125 दिनों में पककर तैयार हो जाती है। इसका बीज मध्यम आकार तथा सफेद रंग का होता है। इसकी औसतन उपज 8-10 क्विंटल/हेक्टेयर है। इसमें 32 प्रतिशत तक तेल की मात्रा पायी जाती है।

#### ए-1

यह किस्म 125 दिनों में पककर तैयार हो जाती है। इसका बीज मध्यम आकार का सफेद रंग का होता है। इसकी औसतन उपज 8-10 क्विंटल/हेक्टेयर है। इसमें 31 प्रतिशत तक तेल की मात्रा पायी जाती है।

#### ए. के. एस. 204

यह किस्म 130 दिनों में पककर तैयार हो जाती है। इसका बीज बोल्ड तथा सफेद रंग का होता है। इसकी औसतन उपज 10-12 क्विंटल/हेक्टेयर है। इसमें 32 प्रतिशत तक तेल की मात्रा पायी जाती है।

#### निंदाई-गुडाई

प्रारम्भ में इसकी वृद्धि बहुत धीमी गति से होती है। इसलिए खरपतवार से प्रतिस्पर्द्धा अधिक होती है। अतः दो बार निंदाई-गुडाई आवश्यक है। प्रथम बुवाई के 20 दिन बाद तथा दूसरी 40 दिन बाद करनी चाहिए। इससे पौधे का विकास अच्छा होता है।

#### जल प्रबन्धन

यद्यपि यह फसल बिना पानी के भी उगाई जा सकती है इसलिए यह वर्षा आधारित फसल कहलाती है लेकिन अधिक उपज के लिए एक पानी बुवाई के 30 दिन बाद देने से फसल की

पैदवार अच्छी होती है क्योंकि इस फसल में फूल आने के समय और दाना भरने के समय पानी की कमी का उपज पर खराब प्रभाव पड़ता है जिससे पर्याप्त नमी नहीं रहने पर उपज में कमी आ जाती है।

#### अर्न्तफसल

यह मुख्यतः गेहूँ, जौ, चना, मसूर के साथ अर्न्तफसल के रूप में बोई जा सकती है। इसके लिए कुसुम की तीन लाइन प्रत्येक मुख्य फसल के नौ लाइन या बारह लाइन के बाद बोना चाहिए। इसके अलावा मुख्य फसल के चारों ओर घेरे (बार्डर) के रूप में भी लगा सकते हैं। इससे जानवरों से भी सुरक्षा की जा सकती है क्योंकि इसकी पत्तियों में नुकीले कांटे पाये जाते हैं।

#### कीट प्रबन्धन

इस फसल में बीमारी तथा कीड़े का प्रकोप कम होता है। लेकिन कभी कुछ रोग दिखायी पड़ते हैं। उसमें मुख्य रूप से:

#### लाही (Aphid)

यह छोटा-छोटा काले रंग का मुलायम कीट होता है। यह प्रायः पत्तियों शाखाओं एवं कलियों पर पाये जाते हैं। ये पत्तियों के रस को चूस कर खोखला कर देता है। जिससे उपज प्रभावित हो जाता है। इसक नियंत्रण के लिए मेटासिस्टाक्स 25 ई. सी. या रोगर 30 ई. सी. को एक लिटर दवा को 1000 लीटर पानी में घोलकर प्रति हेक्टेयर की दर से दस दिन के अन्तराल पर दो बार छिड़काव करना चाहिए।

#### रोग एवं प्रबन्धन

**रस्ट**

यह कवक जनित रोग है तथा यह नवजात पत्तियों एवं शाखाओं में दिखायी पड़ता है। प्रारम्भ में पत्तिया पीली पड़कर मुरझा जाती है। इसके नियंत्रण के लिए थीरम (Thiram) 2 ग्राम प्रति किलोग्राम बीज को उपचारित करना चाहिए।

**सरकोस्पोरा पत्ती धब्बा (Cercospora leaf spot)**

यह कवक जनित रोग है। यह रोग फसल के बढवार के किसी भी अवस्था में दिखायी पड़ता है। इसमें पत्ती के निचले सतह पर गोलाकार भूरे रंग का धब्बा दिखायी पड़ता है जो बाद में भूरे रंग में बदल जाता है और पत्ती नष्ट हो जाती है। इसके नियंत्रण के लिए डाइथेन-जेड-78 अथवा डाइथेन एम-45 को 2 ग्राम/लीटर का घोल बनाकर छिड़काव करना चाहिए।

**ऑल्टरनेरिया पत्ती धब्बा (Alternaria leaf spot)**

यह कवक जनित रोग फूल आने के पहले आता है। और पौधे के समग्र भाग को प्रभावित करता है। लेकिन पत्ती पर ज्यादा प्रकोप होता है। इसमें पत्तियों पर छोटे भूरे रंग के धब्बे सघन छल्लों के साथ बनते हैं। जो बाद में बढते ही जाते हैं और पत्तियाँ झड़ जाती है। रोग का लक्षण दिखायी देने पर 0.2 प्रतिशत मैन्कोजेब या जिनेव 0.2 प्रतिशत का छिड़काव दो तीन बार करना चाहिए।

**विल्ट (Wilt)**

इस रोग में पौधे मुरझा जाते हैं और पौधे के आधार पर सफेद रंग के जाल दिखायी पड़ते हैं। जिससे तना सूखने लगता है। इसके नियंत्रण के लिए तीन से चार साल का फसल चक्र अपनाना चाहिए तथा प्रभावित पौधों को उखाड़ कर हटा देना चाहिए तथा बीज उपचार करना चाहिए।

**कटाई एवं दौनी**

यह मुख्यतया 120-130 दिन में पककर तैयार हो जाता है। पकने की अवस्था में पत्तियाँ एवं फल सुखकर पीली पड़ जाते हैं। इसकी कटाई सुबह के समय करनी चाहिए जिससे पौधे की शखा टूटे नहीं साथ ही काँटा भी उस समय मुलायम होता है। कटाई के बाद 2 - 4 दिन धूप में रखकर सुखा लेते हैं। फिर डण्डी के सहायता से पीटकर दानों को अलग कर लेते हैं। उसके बाद दानों को साफ करके धूप में अच्छी तरह सुखाकर भण्डारण करना चाहिए।

**उपज**

जलवायु, मिट्टी किस्म के आधार पर उपज में भिन्नता हो सकती है। यदि अच्छी तरह से फसल प्रबन्धन किया जाये तो असिंचित दशा में 8 - 10 क्विंटल/हेक्टेयर तक तथा सिंचित दशा में 12 - 15 क्विंटल/हेक्टेयर तक उपज प्राप्त की जा सकती है।

## Lac (*Laccifer lacca*) culture

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Lac is yet another useful product obtained from insects. Lac-culture is the cultivation of lac insects for the production of lac. The Indian lac insect, *Kerria lacca* (Kerr) (Homoptera: Tachardiidae) is cultured for commercial production on traditional host plants, palas (*Butea monosperma*), ber (*Zizyphu mauritiana*) and kusum (*Schleicherao leosa*).



**Host plants of lac insect**

### Indian lac insect, *Kerria lacca* (Kerr)

This insect had been reported from Oriental and Indo Malayan regions (Ben-Dov, 2006). The important lac producing countries are India and Thailand. Among the 22 plant species, *Butea monosperma* Roxb., *Schleicherao leosa* (Lour.) Oken, and *Zizyphus mauritiana* Lamk. are good hosts (Mishra *et al.* 2000) The important centers in India are Bihar accounting 40 per cent of the country's total production, Madhya Pradesh, West Bengal, Orissa, Assam and Uttar Pradesh.

### Introduction

Lac is a natural resinous substance of profound economic importance in India. It is the only resin from animal origin lending itself to diverse applications e.g. as a protective and decorative coating in the form of thin films, adhesives and plastics.

It makes a small but significant contribution to the foreign exchange earning of the country, but the most important role that the lac plays in the economy of the country is that roughly 3-4 million tribal people, Most of the lac production in India is based on the commonly cultivated insect *Kerria lacca* (Kerr) (Bahuguna and Shiva 2002). It generally infests more than 400 plant species (Sharma *et al.*, 2006). India is the major producer of lac, accounting for more than 50% of the total world production. It virtually held a monopoly in the lac trade during the period of the world war-I, producing nearly 90% of the world's total output.

At present total annual average production of stick lac in India is approximately 20-22 thousand tons which forms the raw material for lac industries. a resinous compound of great economic importance (Ramani *et al.* 2007). Chhattisgarh ranks 1st among the states followed by Jharkhand, Madhya Pradesh Maharashtra and West Bengal. These five states contribute around 95 % of the national lac production. Nearly 75-80% of the finished product is exported and only a small portion nearly 20 to 25 % is consumed within the country. In the lac insects. Also, the phloem is their well known target similar to other piercing and sucking insects as these utilize the transported fluid for efficiently fulfilling their nutritional requirement (Kehr, 2006).

The lac insects thrive on the sap of certain plants called lac hosts. So far, over four

hundred species of plants have been recorded as hosts of which those are of importance from the commercial stand point are- Palas (*Butea monosperma*), Kusum (*Schleichera leosa*), Ber (*Zizyphu smauritiana*). Other important lac host plants are Khair (*Acacia catechu*), Ghont (*Zizyphus zylopyra*), Barh (*Ficus bengalensis*), Peepal (*Ficus religiosa*), Arhar (*Cajanus cajan*), Galwang (*Albizialucida*) etc.

#### Important lac host plants

A bushy host plant species, *Flemingia semialata* Roxb. (Leguminaceae: Papilionaceae), has been identified and field tested as a potential fast growing host for intensive lac cultivation during winter season lac crop of Kusmi strain (Aghani) for increasing lac production to match with the growing global demand of lac.

#### Composition of Lac

Lac is a mixture of several substances, of which resin is the main constituent. The approximate percentage of different constituents of lac is given below:

Resin 68 -90%, Dye 2 -10%, Wax 5 - 6%, Mineral matter -3 to 7%, Albuminous matter 5-10%, Water - 2 to 3%.

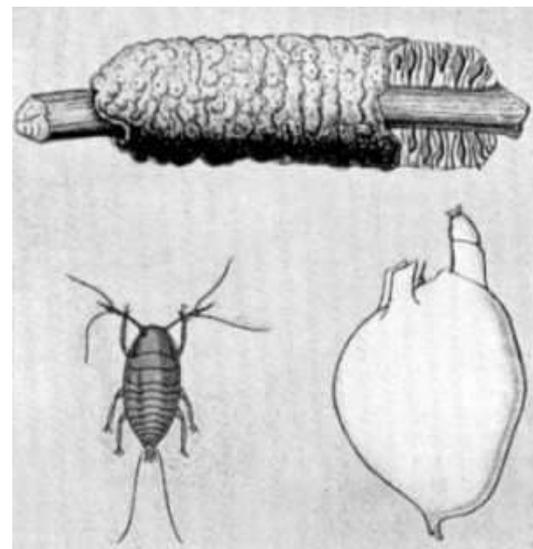


Lac host plant, *Flemingia semialata*

#### Life history of lac insect

The Life cycle of lac insect takes about six months and consists of stages: egg, nymph instars, pupa and adult. The lac insects have an ovoviviparous mode of reproduction. Female lays 200-500 ready to hatch eggs, i.e. the embryos are already fully developed in eggs when these are

laid. Eggs hatch within a few hours of laying, and a crimson-red first instar nymph called crawlers come out. The crawler measures 0.6 x .25 mm in size. The emergence of nymph is called swarming, and it may continue for 5 weeks. The nymphs crawl about on branches. On reaching soft succulent twigs, the nymphs settle down close together at rate of 200-300 insects per square inch. At this stage, both male and female nymphs live on the sap of the trees. They insert their suctorial proboscis into plant tissue and suck the sap. After a day or so of settling, the nymphs start secreting resin from the glands distributed under the cuticle throughout the body, except mouth parts, breathing spiracles and anus. The resin secreted is semi-solid which hardens on exposure to air into a protective covering. The nymphs molt thrice inside the cells before reaching maturity. The duration of each instar is dependent on several factors, viz. temperature, humidity



Life cycle of lac insect, *Kerria lacca*

and host plant.

After the first moult, both male and female nymphs lose their appendages, eye and

become degenerate. While still inside their cells, the nymphs cast off their second and third moult and mature into adult. Both the male and female larvae become sexually mature in about eight weeks. Only the male one undergoes a complete metamorphosis or transformation into another form; it loses its proboscis and develops antennae, legs and a single pair of wings. It is contained in a brood cell somewhat slipper like with a round trap door (operculum) through which it emerges. The adult male is winged and walks over the females to fertilize them. The female brood cell is larger and globular in shape and remains fixed to the twig. The female retains her mouth parts but fails to develop any wings, eyes or appendages. While developing, it really becomes an immobile organism with little resemblance to an insect. Females become little more than egg producing organisms. The female increases in size to accommodate her growing number of eggs. Lac resin is secreted at a faster rate, and a continuous layer coalesces or grows into one body. After fourteen weeks, the female shrinks in size allowing light to pass into the cell and the space for the

‘Ovisac’. The ovisac appears orange due to crimson fluid called lac dye which resembles cochineal. It indicates that the eggs will hatch in a week time. When the eggs hatch, larvae emerge and the whole process begins all over again after the cycle has been completed and around the time when the next generation begins to emerge, the resin encrusted branches are harvested. They are scraped off, dried and processed for various lac products. A portion of brood lac is retained from the previous crop for the purpose of inoculation to new trees.

### **Cultivation practices of lac**

#### **Pruning Operation**

Pruning at proper time is one of the important operations where the branches/ twigs are cut in order to get the maximum numbers of succulent shoots to facilitate feeding of the lac insects. Improvised scientific method of pruning which is done in the brood lac farms is as follows: Pruning is done lightly, because light pruning avoids stunted growth and allows gradual increase in the frame of the tree. Branches more than 2.5 cm in diameter (more than thickness of one’s thumb) are not cut. Branches 1.25 cm or less in diameter are cut flush with a branch or trunk from where they arise. Branches between 1.25 cm to 2.5 cm in diameter are cut, so as to leave behind a stalk of about 30-45 cm in length. Dead and diseased branches are removed, split or broken branches are cut below the split. If trees are old and have lost their capacity to produce vigorous shoots of new flush, heavier pruning is carried out to produce the new wood at the expense of the old. Such operation will bring the tree to a better shape, so that subsequent pruning will give the desired flush. Proper pruning should result a good shape and give plenty

**Period of harvesting**

Type of Harvesting	Trees	Period
Partial harvesting	Palas	June / July
	Kusum	Jan. / Feb or June / July
Complete harvesting	Palas	Oct. / Nov. (Brood lac coupe tree)
		April / May (Ari coupe)

eggs. About this time, two yellow spots appear at the rear end of the cell. The spots enlarge and become orange colored. When this happens, the female has ovipositor a large number of eggs in the space called

of room for the development of new shoots.

**Types of pruning in lac host plants-** Two types of pruning/ coppicing have been recommended for lac culture.

**(i) Apical/ light pruning:** Branches less than 2.5 cm diameter should be cut from base and branches more than 2.5 cm diameter should be sharply cut leaving a stump of 30-45 cm from the base. Diseased and dead portion of branches should be removed completely. Light pruning is recommended for slow growing conventional tree host species like palas, kusum and ber.

**(ii) Basal / heavy pruning:** Branches having less than 7 cm thickness should be removed from the base, whereas thicker



INOCULATION OF BROOD LAC

branches should be cut at a place where it has a diameter of 7 cm. In quick growing bushy host, pruning should be done at a height of 10-15 cm from the ground level e.g. *Flemingia macrophylla*, *F. semialata*. Under Chhotanagpur (Jharkhand) condition the following pruning times for different lac hosts have been found suitable for lac culture.

- **Kusum (*Schleicherao leosa*)** :Pruning should be done either in January / February or in June / July.
- **Khair (*Acacia catechu*)**: Pruning is to be done in March. However, harvesting of lac crop during February may be used to serve as pruning also.

- **Ber (*Zizyphus mauritiana*)**: Pruning should be done in February for inoculation in July and in April / May for inoculation in October-November. For Kusmi lac crop, ber should be pruned 5 months before inoculation. However, recent observations have shown that harvesting of *Aghanicrop* during February may also serve as pruning for inoculation in June- July.

**Collection of brood lac**

Lac sticks, having mature female insects



PREPARATION OF BROOD LAC BUNDLE

ready to give rise to the next generation are called brood lac. As the female lac insect is capable of giving rise to a large number of larvae and to get the maximum benefit, it is essential that the brood should be cut at the proper time, so as to secure the emergence of the maximum possible number of larvae from it. For quality of brood lac, lac crops should be harvested only when mature. The cutting of brood lac should be taken up at the correct time keeping in view the swarming period i.e. the expected date of larval emergence. The ideal time of cutting would be that which will result in the swarming, starting

Inoculation period in different lac crops

Strain	Crops	Normal inoculation Period
Rangeeni	Baisakhi	Oct. / Nov.
	Katki	June / July
Kusmi	Ahgani	June / July
	Jethwi	Jan. / Feb.

immediately or within a couple of days of tying the brood on the host plant.

#### **Selection of brood lac**

After the brood lac has been cut from the plants, it is necessary to subject it to proper examination, so that only healthy lac with the minimum signs of predator and parasite damage is selected for use as brood lac. This is necessary to minimize the chances of propagation of the insect enemies of lac insects.

#### **Inoculation of brood lac**

This operation includes putting of bundles of brood lac (*lac sticks containing gravid females*) in the host twigs for allowing young lac larvae (*crawlers*) to come out of their mother cells and settle on the host plant.

#### **Inoculation of brood lac**

Following aspects should be taken into consideration during inoculation operation:

- Pest -free healthy brood lac should be used.
- Unwanted portions of the brood lac sticks should be removed.
- Bundles of brood lac (about 100 g. by weight) are to be prepared and put these bundles inside 60 mesh nylon netting bags (approx. size 30 x 10 cm.). These will entrap all the predators and parasites but allow the lac larvae to come out.
- The brood lac bundles are tied onto the branches parallel to shoots.
- One meter long brood lac is sufficient to inoculate 10-15 m. long shoots of equal length.
- During the period of inoculation, there are chances of brood bundles falling off and one should go round the inoculated trees in each branch and put such bundles back on the tree.
- Attempts should be made to see that the brood lac bundles are not kept on the tree

for more than the minimum period required for complete inoculation. Ordinarily, this period will be two to three weeks. If the brood lac is kept even after the lac larvae have completely emerged, there is the danger of a larger number of enemy insects emerging from the empty (phunki) brood lac sticks and infesting the field heavily.

#### **Phunki Removal**

The operation pertains to the removal of brood lac bundles used for inoculation purposes and the used up brood lac after complete emergence of lac larvae from female cells is called phunki removal. Ordinarily the emergence of lac larvae from the brood lac ceases after three weeks. The phunki lac so removed is scrapped off thereafter in the brood lac for more than three weeks from the start of larval emergence to avoid emergence of enemy insects. Phunki bundles are pulled down from the trees with the help of pole mounted Phunki hook or by climbing on trees.

#### **Harvesting**

This operation is done any time after the appearance of yellow spot which appears as a spot about a week prior to emergence of lac larvae. But in case of *ari lac* (immature) harvesting, the appearance of yellow spot is not considered. Yield of *ari lac* harvesting is about 25% less than mature crop harvesting. Harvested branches are collected and scrapped to get stick lac. Pruning instruments are used in harvesting. Secateur or long handle tree pruners are better equipments for harvesting lac crop. If there is a surplus brood lac on the host, partial harvesting is done.

In summer (jethwi and baisakhi crops), complete harvesting is done one week before emergence of the larvae whereas in

winter (aghani and katki crops) complete harvesting is done when emergence of larvae start.

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## Social forestry in India: concept and schemes

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Widespread loss of tree vegetation in the developing world in the past few decades led to the emergence of social forestry. It was a response to meet the growing scarcity of biomass and to preserve the environment. Several countries in the developing world launched this type of programme to meet the demands of an expanding population for fuel, fodder and timber. Social forestry was new approach to solve the problem of fuel scarcity with the participation of rural people who would plant, tend and maintain trees by themselves. The species planted would be of their choice. People's Republic of China was one of the first countries to embark on a major community reforestation programme. A massive nationwide campaign was launched during 1950s as a means of replenishing the country's stock of trees depleted by the previous decades of war and overexploitation. By early seventies, the problem of deforestation and environmental degradation were expressed at International Conference at Stockholm during 1972 bringing in to sharp focus the changes required in policies towards environment and the crisis of tree depletion.

Social forestry was first recognized as an important component of forestry development and meeting the rural need in the Interim Report of the National Commission on Agriculture on social forestry during 1972. The commission stressed on the socioeconomic importance of social forestry for rural community as

well as in the management of forest resources. It was felt that by taking up the programme of raising trees, grasses and fodder in the farmers own lands, village commons, wastelands and degraded forests close to habitations. It would be possible to meet the requirements of fuel wood, fodder, small timber for rural housing and agricultural implements etc.

In our country the concept of social forestry is not new. It is found in the preachings of Buddha about 2500 years ago. Lord Buddha preached that every good Buddhist should plant one tree and look after it over five years so that it grows to a full tree and in this way he should plant about 5 trees in his life time.

The Great Emperor Ashoka is credited to have got planted shady trees and fruit trees long the roadsides for the benefit of travellers. During early period of British rule, need for industrial expansion and communication required timber from the forests. Attempts made by the British were simply to reserve and demarcate forests for their industrial needs. No significance was attached to important role of trees to the local population.

In the monumental Report on Improvement of Indian Agriculture (1893) Voelcker observed that forests had not been preserved. His observation on keeping aside village forests for the local people was probably the first observation of importance of forests to people's economy.

Afforestation in the post independence period can be divided in to three phases. In

the first phase 'Van Mahotsav' was started in fifties which failed to attract attention largely due to ignorance at all levels. In the second phase, farm forestry was started in some states in the 1970's. The third phase was the period when social forestry programme actually took off in eighties with massive programmes and ambitious targets.

### **Concept of social forestry**

The word Social forestry was coined by Westoby and used in the Ninth Commonwealth Forestry Congress in 1968. According to Prasad (1985) "Forestry outside the conventional forests which primarily aims at providing continuous flow of goods and services for the benefit of people". This definition implies that the production of forest goods for the needs of the local people is Social forestry. Social forestry is 'social' in the sense of being socially configured, that is, adaptable, dynamic, and responsive to the context and social environment. Social forestry projects take varying forms depending on the particular (political, economic, cultural, ecological) environment and remain flexible because of the 'social creativity' of the participating interest groups shaping this forest management. Social viability and social integration as described above are, besides, only forthcoming when social forestry reacts flexibly to the development of new constellations of interests, to alterations in the pressure for exploitation and to changes in frameworks.

Simply it is the practice of forestry of the people, forestry by the people and forestry for the people. The social forestry practices include the following:

1. Raising wind breakers on dry farm lands.
2. Planting shelterbelt.

3. Planting along roadsides.
4. Planting in village common lands and waste lands.
5. Planting along the railway lines and canal banks.
6. Planting small wood lot in farm lands if it is large.
7. Planting foreshore areas of irrigation tanks.
8. Reclamation of highly degraded and eroded soils.
9. Afforestation of command areas of irrigation projects.

### **Objectives of social forestry**

Social forestry, schemes that have been started all over the country have made a considerable difference in overall forest cover in a short time. Afforestation outside the conventional forest area for the benefit of rural and urban communities. The objectives of Social forestry adopted by the Commission (1976) were based on the economic needs of the community aimed at improving the conditions of living. They are:

- (i) To fulfill the basic requirements such as fuel, fodder, small timber, supplementary food and income from surplus forest products to the rural area and replacement of cowdung.
- (ii) To provide employment opportunities and to increase family income considerable for alleviating poverty.
- (iii) To develop cottage industries in rural areas.
- (iv) To organize them in their struggle for socioeconomic development and to integrate economic gains in the distribution of their benefits to the rural society.

- (v) To provide congenial environment and preserve their cultural identity as their life related to forest.
- (vi) To indoctrinate the value of village level self sufficiency and self management in the production as well as distribution of forest products with social justice.
- (vii) To form the villagers into a well-knit community and an effective functional unit of society which can shape its own destiny.
- (viii) To play a vital role in the reclamation of degraded lands, conservation of soil and moisture, improvement of agricultural production and prevention of environmental deterioration.
- (ix) To increase the natural beauty of the landscape, create recreational forests for the benefit of rural and urban population.
- (x) To protection of agricultural fields against wind speed and natural calamity.
- (xi) To solve the food problem of the rural area to a great extent. Certain edible fruits like cashew, mango, coconut and palms have high nutritional value and grow under social forestry programme.
- (xii) To utilize the available land according to its carrying capacity.

#### **Scope of the social forestry**

The main scopes of the social forestry are

1. Avenue planting in cities.
2. Establishment of industrial shelter belt.
3. Management of urban parks and wild life parks.
4. Urban composites management and efficient recycling.

#### **Components of social forestry**

The scope or components of social forestry defined by the Commission includes farm

forestry, extension forestry, reforestation in degraded forests and recreation forestry.

#### **Farm forestry**

Farm forestry is the name given to programmes which promote commercial tree growing by farmers on their own land. Farm forestry was defined by NCA (1976) as the practice of forestry in all its aspects in and the around the farms or village lands integrated with other farm operations.

#### **Extension forestry**

Extension forestry is the practice of forestry in areas devoid of tree growth and other vegetation situated in places away from the conventional forest areas with the object of increasing the area under tree growth. It includes the following.

#### **Mixed forestry**

Mixed forestry is the practice of forestry for raising fodder grass with scattered fodder trees, fruit trees and fuel wood trees on suitable wastelands, panchayat lands and village commons

#### **Shelterbelts**

Shelterbelt is defined as a belt of trees and or shrubs maintained for the purpose of shelter from wind, sun, snow drift, etc.

#### **Linear strip plantations**

These are the plantations of fast growing species on linear strips of land

#### **Rehabilitation of degraded forests**

The degraded area under forests needs immediate attention for ecological restoration and for meeting the socio economic needs of the communities living in and around such areas.

#### **Recreation forestry**

Recreation forestry is the practice of forestry with the object of raising flowering trees and shrubs mainly to serve as recreation forests for the urban and rural population. This type of forestry is also known as Aesthetic forestry which is

defined as the practice of forestry with the object of developing or maintaining a forest of high scenic value.

#### **Benefits of social forestry**

- Increase the supply of fuel wood and fodder
- Generate rural employment
- Maintain ecological balance
- Appropriate use of wastelands
- Promote village and cottage industries
- Induce environmental and tree consciousness among people
- Relieve pressures from natural forests
- Stabilize agricultural production

#### **Criteria for choice of species section for social forestry**

In order to implement schemes of social forestry, the first important consideration is the choice of species to be planted. As this depends on several factors, it is necessary to know the considerations which govern the choice of species.

- Trees constitute the major component and other components like grasses, bushes, fodder and even crops tend to be relegated to secondary position.
- Trees suitable for road side planting should be hardy, evergreen or winter deciduous, wind firm, fast growing at least in the early stages and fairly tall.
- Species should be suited to climatic, edaphic, physiographic and biotic factors.
- Tree for farm forestry should have long tap roots, attenuated and winter deciduous crown so that they may not affect the productivity of the agricultural crop.
- Tree should have attractive crowns and shrubs should be amenable to pruning into attractive crown shapes.

- They should not have prominent thorns and their planting and caring should be easier and economical.
- Species should be multipurpose in use for firewood, fodder, food, oil, tanning material, host of silk or tussar worms or lac insects etc.

#### **The following multipurpose tree species commonly used in social forestry**

*Acacia nilotica, Ailanthus excels, Albizzia procera, Albizzia lebbek, Anacardium occidentale, Artocarpus heterophyllus, Azadirachta indica, Bahinea speices, Casuarina equisetifolia, cocus nucifera, Dalbergia sissoo, Emblica officinalis, Eucalyptus spp., Gmelina arborea, Maduca latifolia, Mangifera indica, Morus alba, Pongamia pinnata, Populus spp., Syzygium cumini, Tamarindus indica, Terminalia spp. and Ziziphus mauratiana.*

#### **Achievements of social forestry**

- Increased area under tree cover.
- Increased production of industrial timbers, firewood and fodder.
- Increased employment opportunities for the rural poor.
- Improvement in environment.
- Enhance the conservation of soil and water table.

#### **Important schemes being implemented for social forestry**

- Aerial seedling.
- Area-oriented fuelwood and fodder scheme.
- Awards.
- Categorisation and identification of wastelands.
- Decentralised nurseries programmes.
- Externally aided projects.
- Grands-in-aid to voluntary agencies.
- Greening of Himalayas.
- Margin money assistance scheme.
- Operation soil watch.

- Promotion of Co-Operatives.
- Rural fuelwood plantation scheme.
- Scheme on minor forest produce.
- Silvipasture scheme.
- Tree Patta scheme.

**Constraints in obtaining people's participation in Social forestry**

- Antipathy to trees.
- Credit schemes, market support measures and tax rules.
- Lack of appropriate technology.
- Lacking of appropriate policies and public awareness.
- Lacking of suitable organization.
- Most people show future ignoring behavior.
- Small size of holdings and land ownership.
- Social forestry generates common property resource.

## Burma drek (*Melia composita* Willd.) – a suitable species for agroforestry in tropical regions of India

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### Introduction

*Melia composita* (syn. *Melia dubea*) is a large Indonesian species cultivated in Africa and Australasia where it is also known as the White Cedar or the Ceylon Mahogany. It is usually planted for ornamental and fuel wood purposes. Its trade name in India is Malabar Neem. The mature tree attains height of 20 m with spreading crown and a cylindrical straight bole of about 9 m length and 1.2 to 1.5 m. girth. In India, it is found in Sikkim, Himalaya, North Bengal, Upper Assam, hills of Orissa, Deccan and Western ghats at altitudes of 1500 to 1800 m. It occurs in moist localities and tropical forests. It yields useful timber. Apart from ornamental purposes it also makes a good avenue tree and a shade tree in plantations. The fragrant greenish white flowers contribute to its ornamental value. It grows rapidly and hence is a favoured species for agroforestry purposes.

*M. composita* is commonly known as Burma Neem or Ghana Neem. In Punjab it is also called locally as “Drek”. It is a fairly large, deciduous and fast growing tree and popularly grown in agroforestry in plains of northern India. The tree has a straight, cylindrical long bole up to a height of 20 m.

Outside India, the tree has its appearance in Sri Lanka, Malay Peninsula, Java, China and Australia. On the basis of its distribution it can be assumed that the tree is capable of withstanding wide

range of climatic conditions. Sometimes the tree is also planted ornamentally and makes a handsome avenue and shade.



**Boundary plantation of *Melia composita***

### Wood characteristics

*M. composita* has a grayish white heart wood and light pink to light red heartwood. The heartwood turns pale on aging. The wood with a low specific gravity (about 0.33) is very light and hence is not very useful for heavy duty uses. The wood is straight grained and coarse and somewhat uneven structured. The timber is not durable in exposed conditions. However, it is reported to be moderately durable under cover. As far as durability and strength are concerned, it is considered inferior to neem. The wood is prone to end splitting and discolouration and hence must be converted and seasoned immediately after felling. It is reported to be easy in sawing and working.

The wood of this species is useful for packing cases, cigar boxes, ceiling planks, building purposes, agricultural implements, pencils, match boxes etc. In Sri Lanka, it is used for outriggers of

boats. It is also suitable for musical instruments, tea boxes and ply board.



**Block plantation of *Melia composita* with wheat**

Its high calorific value (5,000-5,200 cal) makes it a good fuel wood. In addition to the wood uses, its bitter fruits are considered to have anathematic properties.

Keeping in view of the scarcity of traditional timbers, every possible plantation grown species needs to be explored as far as utilization potential is concerned. Recently this tree has found a good place among the plantation grown species of Punjab Forest department. It is time that the utilization aspect of this species is addressed. The wood of *Melia composita* has a specific gravity of 0.398, modulus of rupture of 663 kg/cm<sup>2</sup> and modulus of elasticity of 71000 kg/cm<sup>2</sup> for dry condition. A preliminary study on some mechanical properties carried out on some branch wood samples of this species is indicative of its utility in sports goods and packing cases.

#### **Growing conditions**

The tree has a capability to grow in arid and semi-arid and also in the semi-moist areas. Due to its fast growth and multiple uses, it is emerging as a favourite tree for growing under agroforestry plantations in the North-Western states of the country.

The tree becomes leafless for a short period from December – February and new leaves appear in February – March. The flowers appear in the April and soon after replaced by avoid drupes, which ripen in the cold season.

Regeneration of the species is very common through seeds and the plants can be grown very easily by sowing the seeds in nursery. However, tree improvement demands its development through vegetative propagation techniques. Under the propagation through seeds, sowing of whole fruits is done during February – March. One to four seedlings may emerge from a single fruit. No pre-sowing treatment is required, however keeping the seed in a mixture of liquid cow dung, soil and water for 10 days results good germination. The seeds are sown 2 cm deep and 15cm apart. Watering is done regularly after sowing until germination complete. The seedlings are pricked when they are 5-8 cm in height in July. These are retained on nursery for one year.



***Melia composita* with Maize**

The seedlings are planted either in July or during water months when they are leafless using ball of earth around the plant in both cases. The Spacing under agroforestry practices is usually adopted as 5m x 5m and 5m x 6m. Entire planting has a great promise of success, when the seedlings are about 1 m high.

In the plantation done at spacing 4x6 m., the light remains normal and the under storey crop gets a proper light for its survival and proper growth (Singh, 2011). Under an experiment *M. composita* (syn. *M. dubia* Cav.) was observed to increase its girth the fastest its girth the fastest i.e. 25cm/ year, almost 100 percent increase over *Acacia mangium*, *Gmelina arborea* and *Ailanthus triphysa* (Warrier *et al.*, 2012)



Canopy of *Melia composita*

### Management

Under canopy management practices the side branches of the plant are regularly pruned to get a long and clean bole. Pruning is usually done during winter and before monsoon. Cut areas after pruning should be painted with an insecticide embedded paint to check pathogenic attack. In plantation, weeding for the first two years is necessary.

*M. composita* is usually not attacked seriously by pests and pathogens. However, some defoliators cause some injury to the plants. These are: *Ascotis selenaria*, *Hubner*, *A. selenaria imparta*; *Acherantea lachesis*, *Psilogranna Maneppron* etc. These insect, pests can be controlled by spraying 0.05% Phenetrothion or Metacid 50 E.C. Among pathogens *Ganoderma lucidum* causes stem and twig cankers. For

controlling this canker disease soil drenching with 0.1% Bevistin is useful.

### Performance under agroforestry

*M. composita* is a fast growing and suitable species under agroforestry system in plains of North India even in adverse conditions the species performs better. It can gain height up to 14 m with an average girth of 65 cm in 4 years. The plants also produce a good quantity of fuel wood under a regular and proper canopy management. Under an agroforestry system, the interaction of this species found suitable with wheat and maize, which are generally grown in Punjab. As well as soil concern, the fertility increases up to some extent in the plantation of *M. composita*. A proper guidance to farmers to adopt agroforestry practices through different extension tools can also be helpful to raise the forestry species like *M. composita* on their farmland under agroforestry without affecting under-storey crops.

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## Traditional vis-à-vis mechanized sal leaf plate making: a subsidiary livelihood source for tribes of Jharkhand

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Sal leaf plates are cheap, disposable, biodegradable, hygienic and eco-friendly substitute for the conventional thermocol and plastic plates, used at large scale by the grocery shops, petty hotels, temples, marriages, festivals, ceremonies *etc.* and to make offerings to Hindu Gods (Anon., 2008). The shiny dusky golden colour with wild deciduous essence make the Sal leaf plates ideal for parties and gatherings and adds dignity to celebrations (Padhi *et al.*, 2001). Sal leaf plates are widely preferred by eco-conscious world and thus, there is a great domestic as well as global demand (Anon., 2010).



### Traditional sal leaf plate making

Traditionally, the Sal leaf plate making is a prominent small scale cottage industry of forest fringe tribal households in Jharkhand, which is subsidiary source of their livelihoods, supporting their economy for poverty alleviation besides maintenance of their cultural heritage (Sarkar and Chatopadhyay, 2006). This cottage industry does not require heavy capital investment and heavy

infrastructure such as machinery, buildings and power (Ghosal, 2011). Collection and processing of Sal leaves, stitching of leaf plates, its drying, packaging,



### Raw sal leaf plates

transportation and marketing are the main operations carried out for around 8 months except March-April and July-August (Rout *et al.*, 2010) (Plate 1 to Plate 4). One tribal person stitches 1000 plates day<sup>-1</sup>; thus, by working for 25 days month<sup>-1</sup> and for 8 months annum<sup>-1</sup>, he produces 200000 Sal leaf plates annum<sup>-1</sup>. The Sal leaf plates are sold to the consumer or petty traders @ Rs. 0.125 plate<sup>-1</sup> in the local markets. Thus, the enterprise generates an average earning up to Rs. 25000 annum<sup>-1</sup> and employment of 400 person days annum<sup>-1</sup> in the tribal households (Islam *et al.*, 2015). This income conform almost 80% of the cash income for the households dependent on this enterprise.

Although, the Sal leaf plates making provides livelihoods to thousands of forest dwelling tribal households and profits to hundreds of big and small

traders in Jharkhand, the enterprise is a high labour intensive and less remunerative (Islam *et al.*, 2013). Despite occupied in such novel



**Processing of raw Sal leaf plates**



**Sale of raw sal leaf plates**

profession, the tribal people are underprivileged facing acute poverty, unemployment, migration, food insecurity, malnutrition and livelihood vulnerability (Bedia, 2014; Islam *et al.*, 2014). To improve their living conditions, the value addition of traditional Sal leaf plate making through mechanized pressing is the key intervention (Singh and Quli, 2011).

The value addition in traditional Sal leaf plate making by mechanized moulding by a pressing machine will boost up household income from Rs. 25000 annum<sup>-1</sup> to Rs. 49100 annum<sup>-1</sup> and enhance the employment opportunity from 400 person days annum<sup>-1</sup> to 450 person days annum<sup>-1</sup>. (Plate 5 to Plate 6). The adoption of the trusted mechanized

value addition technology in traditional Sal leaf plate making will ensure an additional income of Rs. 24100 annum<sup>-1</sup> (96.40%) with an additional employment of 50 person days annum<sup>-1</sup> (12.50%) in the tribal households (Islam *et al.*, 2015). To reinforce the Sal leaf plates based livelihood diversifications, promotion and development, the policy makers, planners and social workers should implement mechanized Sal leaf plate



**Sal leaf plate pressing machine**



**Mechanized Sal leaf plates**

making through developmental schemes of Governmental and non-Governmental organizations. Further, efforts should be taken for skill development and capacity building through effective extension and training activities among tribal households engaged in the occupation.

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## Impact of soil and water conservation works of Bundelkhand special packge - a case study

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### Introduction

The basic objective of the study is to monitor and evaluate the impact of soil and water conservation works taken up in the six forest divisions of Bundelkhand region viz. Chhatarpur, Datia, Damoh, South Sagar, North Sagar and Nauradehi (Wildlife) of Madhya Pradesh. Almost the entire area is undulating and full of mountains of varied dimensions. The hills are of medium to steep gradient. The areas mainly drains off through Bearma in the north and in to the river Hiran in the south east. Pure Teak forests are found on the soil derived from trap rocks but teak is found in lesser quantity on the soil derived from conglomerate Schists and granitic gneiss. The original vegetation consists of tropical dry forest, dominated by *Tectona grandis* associated with *Diospyros melanoxylon*, *Anogeissus latifolia*, *Lagerstroemia parvifolia*, *Terminalia tomentosa*, *Lannea coromandelica*, *Hardwickia binata* and *Boswellia serata*. Summer season is comparatively mild. The average daily minimum and maximum temperatures are 19°3' and 43°7' C respectively. The average annual rainfall is in between 700 mm to 1800 mm and average number of rainy days is 60, about 93% rainfall is in the rainy season. There is shortage of water in whole of the districts. Low rainfall, meteorological drought, soil erosion, poor agriculture, lack of education and poverty are the main obstacles for development of the region.

Most of the forest area forms the upper reaches of the watershed of major rivers. Being away from the mainstream of development, most of the forest fringe villagers are dependent on forests for their livelihood. This puts lot of pressure on the adjoining forests. A mass campaign to generate awareness about the concept of soil and water conservation, literacy is urgently required. Apart from this employment generation to overcome economic stagnation is also required. Above reasons lead to the formation of a project to mitigate drought like conditions in the divisions.

The package was approved on 19<sup>th</sup> November 2009 and during four months of the financial year 2009-10. The focus was mainly on sensitization of the states, development of sector-wise proposals, technical scrutiny and approval for release of funds. The works of development under special package of Bundelkhand is proposed to be implemented with the help of Joint Forest Management Committees (JFMCs) through the Forest Development Agencies (FDAs). The major component of this project is sequenced into three phases - preparatory, watershed works, and consolidation and withdrawal phase.

### Preparatory phase

The preparatory phase includes survey of forest area, community mobilization and formation of community groups, entry point activities and micro planning support, baseline survey, and hydro

geological survey of the watershed to map out zones of potential ground water recharge, storage and sustainable utilization. Field visit to successful models by stakeholders and their training is covered under this phase.

#### **Watershed works phase**

This phase includes ridge area treatment operations to reduce volume and velocity of surface run-off, including regeneration of vegetative cover in forest and common land, staggered trenching, contour and graded bunding, bench terracing etc. through a combination of vegetative and engineering structures.

#### **Consolidation and withdrawal phase**

This phase comes into picture after the watershed treatment work is complete. In this phase the resources augmented and economic plans developed in watershed work phase acts as the foundation to create new nature based sustainable livelihoods to raise productivity level.

Work is proposed to be implemented with the help of Joint Forest Management Committees (JFMCs) through the Forest Development Agencies (FDAs). Therefore, an attempt has been made to study the impact of soil and water conservation works of six forest division viz. Chhatarpur, Datia, Damoh, South Sagar, North Sagar and Nauradehi (Wildlife) of Madhya Pradesh under Bundelkhand Special Package.

#### **Methodology**

As per the TOR of the agreement between Madhya Pradesh Forest Department and Tropical Forest Research Institute (TFRI), 30% of the works were randomly chosen to ensure that about 30% of various types of soil and water conservation measures counter dyke, counter trenches, check dams, gully plugs, percolation tanks and storage tanks, plantations and pasture

development have been selected for monitoring. Thus, the methodology of selecting sites was random systematic sampling with moderation to ensure 30% works are also selected and these are well distributed in different ranges of the above six forest divisions.

The teams of TFRI, Jabalpur, constituted for this purpose have inspected 30% of various type of works under Additional Central Assistant Component (ACA) and National Afforestation Programme (NAP) heads. The soil and water conservation structures like counter dyke, counter trenches, check dams, gully plugs, percolation tanks and storage tanks have been inspected along with the qualified Civil Engineer who has evaluated these works. The evaluation work has conducted on the technical as well as the social aspects. Rating of performance and quality of developmental works was done on a scale of 100 marks. Maximum marks allotted for technical and social works were 70 and 30, respectively. All the works, carried out under the Bundelkhand package, has been evaluated separately. The work was graded as excellent (scoring > 75% marks), good (61-75% marks), satisfactory (51-60% marks) and poor (< 50% marks). Detailed scoring format for each activity was designed by the external Technical Expert (Civil Engineer).

#### **Observations**

##### **Project impact assessment (PIA)**

In six Forest Divisions of Bundelkhand region in Madhya Pradesh, most of the villages are inhabited by tribals, small and marginal farmers and agricultural laborers. During the survey period, the wells were randomly observed around the watershed areas, some of which dry out in summer and in fact drinking water is available only in few wells. The Village Forest

Committees (VFC) has finalized the activities / works to be carried out in their areas of watersheds and the Detailed Project Reports (DPR) have been prepared by the Forest Department in consultation with the concerned VFCs.

Interaction with people revealed that water level in wells / tube and nalahs around the watershed areas had increased & there was increase in agricultural crop production also. In some cases, even some additional area has also been brought under plough. Some farmers have dug out new wells and purchased new water pumps, tractors, cattle and other house holds items for their personal use, which is an indication of the economic upliftment of local people.

#### **Water regime**

Increase in surface water, ground water and recharge of nalahs in most of the micro watershed areas, to different degrees. Water is now available throughout the year in storage tanks. With the drainage line system works, the streams coming out of the forest have come alive and are having some water i.e, the period of water availability has effectively extended.

#### **Change in land use pattern and crop intensification**

There is positive change in land use pattern in most of watershed areas across all ranges. Due to availability of water in the wells /tube wells and nalahs, the number of agricultural crops raised from same land had increased from 1 to 2 and 2 to 3 and more area also. The availability of water in the wells resulted in not only increase in number of crops but also a noticeable change in cropping pattern was also observed from gram to wheat, mustard to wheat. As a result of soil and water conservation method, the yield of crops viz. paddy, wheat, gram, soyabean,

arhar, masur, pea, urad have also increased substantially. The benefits in the first year after the treatment are conspicuous and have a potential to substantially improve the economy of the people in coming years. In some plantation sites of NAP, grass growth has increased to fulfill the requirement for their cattle to a large extent.

#### **Impact of training**

Under the capacity building head, 25 unemployed youths having std. 8<sup>th</sup> qualification in the age of 18-30 yrs., a 3 months training programme was organized under 'Functional Vocational Training & Research Society, Bangalore'. These youths have been trained as Security Guards. Tie ups with the private companies for their deployment is also being arranged. Provided training to 30 women in the Jute handicraft and their marketing is being assured. Training on tailoring to 20 women through NGO. Fish Culture Training to 50 participants and distributed fish seeds. Poultry Farming training to 50 participants. Training on the preparation of Agarbatti to the villagers of watershed and adjoining areas under Micro-enterprises head.

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## औषधी व सुगंधी वनस्पती

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औषधी व सुगंधी वनस्पतीच्या पासून विविध औषधे तसेच सौंदर्य प्रसाधने बनविल्या जातात, मानवी जिवनात सुगंधाला विशेष असे स्थान आहे एक ही प्राणी नाही की ज्याला सुगंध आवडत नाही विविध अत्तरे, सौंदर्य प्रसाधने, साबण या व्यतिरिक्त सुगंधी तेलाचा उपयोग खाद्य पदार्थ, शरबते, पेये, पान मसाले या मध्ये सुध्दा होतो. या शिवाय सुगंधी तेलाचा उपयोग औषधी मध्ये जसे पेन बाम, सांधे दुखी, व्हिटामिन 'अ' जिवनसत्व तयार करण्या साठी, टूथपेस्ट इत्यादी मध्ये होत आहे. जगभर सुगंधी तेलाला चांगली मागणी आहे. आपल्या भागात चांगल्या प्रकारे येवू शकणारे सुगंधी गवजे जसे तिखारी गवत, गवती चहा, जावा सिट्रोनेला या गवता पासून उर्ध्वापातन पध्दतीने सुगंधी तेल काढतात. वरील गवता व्यतिरिक्त दवणा, जिरेनियम, पुदीना, तुळस, सब्जा, निलगीरी इत्यादी पासून सुध्दा सुगंधी तेल निर्मित होते. सद्यः स्थितीत जागतिक स्तरा वर सुगंधी तेलाच्या असणाऱ्या विविध उपयोग मुळे निश्चित अशी व चांगली मागणी राहणार असल्याने सुगंधी पिकाची शेती करून त्याद्वारे सुगंधी तेल निर्मित करणे फायदेशीर ठरू शकेल, अशी चिन्हे दिसत आहेत.

औषधी व सुगंधी लागवड करण्या अगोदर बाजारपेठेचा अभ्यास जसे कोण कोणत्या औषधी व सुगंधी वनस्पतींना मागणी आहे नेमका कोणता वनस्पतीच्या भाग लागतो, त्याची प्रत व बाजार दर, मागणी किती आहे इत्यादी विषयी सखोल माहितीची प्रत्यक्ष त्यात्या खरेदीदारशी संपर्क करून खात्री करावी शेतकरीगट किंवा समुहा द्वारे मोठ्या प्रमाणा वर लागवण केल्यास बाजारपेठेत पाठविण्यात सोपे व व्यवथित दर मिळण्यास उपयुक्त ठरते.

औषधी व सुगंधी वनस्पतीच्या संदर्भात लागवडी साठी उच्च प्रतीच्या वाणा बी-बियाणे, रोपे उपलब्ध नसणे ही एक प्रमुख अडचण आहे. त्या संदर्भात नागार्जुन वनौषधी उद्यानात अकोला येथे जवळपास 400 वनौषधीच्या विविध प्रजाती या मध्ये निरनिराळ्या ठिकाणा वरून औषधीवनस्पती जमा करून व त्यांची ओळख करून त्यांचा संग्रह करणे, आपल्या हवामानात येवु शकणाऱ्या व व्यापारी दृष्ट्या परवडणाऱ्या औषधी व सुगंधी वनस्पती विकासच्या विविध योजना बाबत माहिती देण्यात आली आहेत. सद्यः स्थितीत उष्णकटिबंध

वनअनुसंधान संस्थान जबलपुर एवं वानिकी अनुसंधान केन्द्र छिन्दवाडा व डॉ पंजाबराव देशमुख कृषि विद्यापीठ, महाराष्ट्र. येथे औषधी व सुगंधी वनस्पतीच्या लागवणतंत्र, प्रक्रिया, उत्पादने खरेदी-विक्री करणाऱ्या किंवा माती परीक्षण विषयी माहिती करिता प्रत्यक्ष संपर्क करावे.

या भागात अश्वगंधा, शतावरी, काळमेघ, सफेदमुसळी, कस्तुरीभेडी, इसबगोल इत्यादी पिकांवर लागवडतंत्र विकासाच्या दृष्टिने संशोधनकार्य शुरु आहे तसेच वनौषधीच्या काढणीच्या वेळ निश्चित करणे, जेणे करून त्यातील गुणद्रव्ये जास्तीत प्रमाणात राहतील व कापणी पश्चात वनौषधी गुणद्रव्या वर साठवणुकीच्या वेळेचा व पध्दतीचा होणारा परीणाम सुध्दा अभ्यास आहे. औषधी व प्रसाधनांना अनन्य महत्व प्राप्त झाल्याने जागतिक स्तरावर औषधी व सुगंधी वनस्पतीच्या बाजारपेठा हजार करोडोच्या उलाढलीत पोहचली आहे. औषधी व सुगंधी वनस्पतीच्या आर्थिक दृष्ट्या फायदेशीर शेती होण्या करिता उत्पादीत मालावर प्रथमिक स्वरूपाच्या प्रक्रिया

करूनच बाजारपेठत पाठविणे महत्वाचे आहे. बहुतेक प्रक्रिया ग्रामीण स्तावर सहज साध्य होवू शकते. तथा प्रक्रिया सोप्या असल्या तरी माहिती घेणे आवश्यक ठरते.

### वनस्पति स्वच्छ करून सुकविणे

औषधी वनस्पतीच्या उत्पादित माल शेतातून किंवा जंगलातून आणल्यानंतर स्वच्छकेल्या नंतर सुकविणे अत्यंत महत्वाची प्रक्रिया आहे. सर्वसाधारण प्रमाणे सावलीत व तेही पातळ थरात पसरवून सुकविणे योग्य असते काही वनौषधी कडक उन्हात सुकविल्याने त्यातील गुणद्रव्यांचा ह्यास होवू शकतो. उत्पादित माल जलद गतीने सुकविण्यासाठी ओव्हनचे सुध्दा वापर करता येतो. परंतु ओव्हनच्या तापमान वर अधिक लक्ष्य देणे गरजेचे ठरते. ओव्हनचे तापमान 60<sup>0</sup>से. च्यावर नसते. वनस्पती सुकविण्यासाठी ट्रे मध्ये वनस्पती चे तुकडे पसरवून ते ट्रे ओव्हन मध्ये ठेवतात. ब्लोसोअर किवा पंख्याद्वारे गरम हवा ओव्हन मध्ये खेळविण्यात येते. त्यामुळे वनस्पती जलद गतीने सुकविल्या जाते.

### वनस्पती भुकटी तैयार करणे

आयुर्वेदिक चिकित्सा पध्दतीत वनौषधी चुर्णाला महत्वाचे स्थान आहे. वनौषधीच्या उपयुक्त भागाचे भुकटी रूपांतर करण्यालाच चुर्ण म्हणतात. तसेच भुकटी रूपांतरीत केल्याने अर्क किंवा अरिष्ट तयार करणे सोयीस्कर होते. भुकटी तयार करण्यासाठी हॅमर मिल्सचा सहसा वापर करतात. अशा मिल्स मध्ये कडक कठीण मुळ्याचे तुकडे सुध्दा बारीक होवू शकतात. परंतु पूर्ण तयार करण्यासाठी बॉल मिल्यचा वापर करतात. कारण चुर्ण जितके बारीक तितकेचे गुणकारी व परिणाम कारक असतात.

### पाण्यातील अर्क काढणे

आयुर्वेदिक औषधी निर्माण करण्यासाठी पाण्यातील वनौषधीच्या अर्कच्या वापर होतो. पांरपरिक पध्दतीत कढई सदृष्य पात्रात घेवून त्यात वनस्पती टाकण्यात येते. आवश्यकतानुसार ठराविक तापमान व वेळ ठरवून सदर पात्राला ताप विण्यात येते. ठरविलेल्या वेळानंतर सदर पात्रातील अर्क युक्त द्रावण थंडझाल्या नंतर

गाळण्यात येते. पूर्ण काढण्या साठी वारंवार प्रक्रिया करतात व नंतर पाणी बाष्पी भवनादारे काढून टकतात. अशा रितीने अधिक त्रिवतेचा अर्क तयार करण्यात येतो.

### सॉलव्हण्ट अर्क काढणे

या प्रक्रियामध्ये वनस्पती अर्क काढण्यासाठी ऑरगनिक सॉलव्हण्टचा उपयोग करतात. ऑरगनिक सॉलव्हण्टस जसे अल्कोहल, ऑसिटोन, क्लोरोफार्म, हेक्झेन इत्यादी वापर करून अर्क काढण्यात येतो. सॉलव्हण्टची निवड त्यात्यागुण दगव्यांच्या विरघळण्याच्या क्षमतेवर अवलंबून असते हा अर्क विविध औषधीमध्ये वापरतात. सुगंधी तेल काढण्यासाठी ग्रामीण स्तरावर अर्धा ते एक टन क्षमतेच्या भट्टीची स्थापना करता येते. अशा भट्टीच्या उभारणीला 3.50 लाख ते 4.50 लाख रूपये खर्च अपेक्षित आहे. भट्टी वर्षभर सुरू ठेवण्यासाठी सुगंध गवती लागवड अंदाजे 20 – 25 हेक्टर वर सुनियोजित पध्दतीने करावयास हवी जेणे करून दररोज 1 ते 2 टन गवततेल काढण्यास उपलब्ध होवू शकेल.

अशाप्रकारे वनौषधी उत्पादनावर ग्रामीण स्तरावरच प्राथमिक स्वरूपाच्या प्रक्रिया केल्यास अशा उत्पादनाची मुल्यवृद्धी तर होतेच त्याच प्रमाणे रोजगार निर्मीतीस सुध्दा हातभार लागू शकतो.

### औषधी व सुगंधीवनस्पती विकासाच्या विविध योजना

- 1 व्यापारी तत्वावर लागवडीसाठी अर्धसहाथ्य पुरठवा करणे.
- 2 प्रात्यक्षिक तथा बिजोत्पादन क्षेत्र स्थापन करणे.
- 3 औषधी व सुगंधीवनस्पती लागवड प्रक्रिया करणे.
- 4 औषधी व सुगंधीवनस्पती संकलन- वितरण अर्धसहाथ्य.
- 5 मागणी असलेल्या वनौषधी मोठ्या प्रमाणावर उत्पादन, मुल्यवृद्धी व विपणन संबंधी विविध योजना.

**संपर्क**

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येथे नमूद केलेल्या पत्याशिवाय इतरही कंपन्या औषधी व सुगंधीवनस्पती उत्पादनांची खरेदी-विक्री करतात. या पिकांची लागवड करण्यापूर्वी प्रत्येक शेतकऱ्याचे त्याची खरेदी-विक्री व्यवस्था, दर इ. बाबत पूर्ण चौकशी-खात्री करून घ्यावी. या बाबत सदर कंपन्यांशी परस्पर पत्र व्यवहार करावा.

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## Flowers as natural remedies

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Flowers not only give happiness and joy to the senses, but also health to the body. We all appreciate the beauty, the vibrant colours, and the aesthetic appeal of flowers. What most of us are unaware of is that they also contribute to our health in various ways. There are a lot of flowers that are edible and are good for health. We must remember though, that not all flowers are edible.

Roses are used in beverages to help people who suffer from irritable bowel disease, gall bladder and liver problems. It is said to help you relax and distress. *Viola odorata* (Neelapushpa in Sanskrit) when crushed and boiled in a cup of milk, relieves the pain and swelling of inflamed tonsils. Neem flowers (*Azadirachita indica*) are very good for intestinal worms. Flowers of the flame of the forest tree (*Butea monosperma*), when steamed,



mashed and applied on a boil heals it. Ground tamarind flowers make excellent anti-persirants. Fresh jasmine flower paste is a soothing salve for psoriasis. Chamomile (*Matricaria recutita*)

blossoms are said to be good for kidneys, spleen, colds, bronchitis, bladder troubles and for sores and wounds. The milk from the cut end of the dandelion is said to help get rid of warts. The juice of chrysanthemums cures cold and fever.

There are myriad varieties of the rose and hibiscus. It is practically impossible to list all of them and discuss their health benefits. The common ones used in herbalism are the *Hibiscus rosa sinensis*, *Calendula officinalis* and *Rosa centifolia*, which are discussed here.

### **Hibiscus (*Hibiscus rosa sinensis*)**

*Hibiscus rosa sinensis* belong to the family Malvaceae has been used in Siddha medicine, (traditional Tamil medicine from the South of India) for many centuries. It is considered a laxative, aphrodisiac, and an emmenagogue (stimulates menstruation). It is a blood purifier and is good for curing cystitis (inflammation of the bladder), cough, syphilis, and gonorrhoea (STD). It is also said to be a very good natural source of vitamin C.

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**Hibiscus home remedies**

- The leaves when ground to a paste with fenugreek seeds and water, can be used as a shampoo and conditioner for hair.
- 8 – 10 hibiscus flowers soaked in 1 ½ litres of water overnight and consumed three to four times a day for 2 – 3 days (about 2 tbsp at a time) is good for urinary diseases.
- It cools the body and is said to be good for psychiatric ailments.
- To prevent hair loss, the juice of the flowers is mixed with coconut oil and heated till the water evaporates. You can store the oil and apply it on the hair for ½ an hour before a bath.
- Water evaporates. You can store the oil and apply it on the hair for ½ an hour before a bath. A decoction of the hibiscus flower, milk, jaggery and carom seeds are good for leucorrhoea.
- About 5 hibiscus flowers ground to a paste, and consumed with water every morning on an empty stomach, for a week before the expected date of periods helps to regularise periods.
- For vaginal discharge or irritation, a paste made from 3 – 4 flowers, mixed with water, and taken on an empty stomach for a week, is said to help.
- For sexual debility, take a tsp of dried and powdered hibiscus buds, add a cup of warm milk and a tsp of honey, and have it twice a day, but for not more than 4 days.

**Hibiscus Tea**

Hibiscus has a mild flavour and is used to make tea in many cultures throughout the world. To make the tea, pour boiling water over 1 – 2 tbsp of the petals of the flower

and keep for 5 -10 minutes. Strain and drink.

**Rose (*Rosa centifolia*)**

This rose is also known as the cabbage rose. It is known for its fragrance and for having many petals. Traditionally associated with Venus, the goddess of love and beauty, it has also been known for its healing powers. It is used in a number of cosmetic and skin care products. It has astringent and anti-inflammatory properties. It is known for its aphrodisiac, sedative and antidepressant qualities.

**Rose home remedies**

- The rose flower has various medicinal properties. Roses contain vitamin C, pectin, and citric acids. It also cools the body.
- Rose tea helps to fight against infection in the digestive tracts and intestines.
- The rose petals release fluid retention and hasten the elimination of wastes through the kidneys.
- A decoction prepared by boiling rose petals in water is effective against sore throat.
- Rose oil is also used in a room diffuser and for aromatherapy. It is helpful for stress related conditions like insomnia and nervous tension, due to its soothing properties.



- A decoction prepared from rose petals is an effective treatment for bladder infection.
- Rose petals help to cleanse the liver and gall bladder and promote bile flow.
- Make an infusion of crushed rose petals by adding it to a cup of boiling water. Strain and drink it twice a day for diarrhoea.
- For chapped lips and dry skin, equal portions of glycerine, rose water and fresh lime juice mixed together and applied on the body helps.
- Rose petal tea is a very good remedy for irregular periods.
- Rose water makes a good eye wash for sore or inflamed eyes.

#### **Rose hips**

Rose hips are the round portion of the rose flower below the petals. They contain the seeds of the rose plant. Fresh rose hips contain vitamin C, but it is said that processing the plant or drying it, destroys most of the vitamin C. Some species like the Dog rose and (*Rosa canina*) Rugosa rose (*Rosa rugosa*), are very rich in vitamin C, amongst the richest in plant source. Taken in the form of tea they are good for infections, particularly bladder infections. Rose hip tea is also used in the treatment of diarrhoea. It helps to fight off colds and flu germs and viruses. The presence of organic acids in rose hip tea helps to strengthen the digestive tract and the stomach lining as well as eliminating toxic wastes in the intestines.

#### **Rose tea**

Tea can be made from rose buds, rose petals and rose hips. Rose bud and rose petal tea has been used in Chinese medicine for more than 4000 years. Rose tea can be made by simply seeping rose petals in boiling water for three to five

minutes. To make a tea from rose hips, chop the rose hips and boil them in water for about half an hour. Strain and drink. You can add honey if you want to.

#### **Marigold (*Calendula officinalis*)**

Marigold or calendula is a annual and perennial herbaceous plants in the daisy family Asteraceae that has pale green leaves and golden orange petals. The name *calendula* is a modern Latin diminutive of *calendae*, meaning "little calendar", "little clock" or possibly "little weather-glass". The common name "marigold" refers to the Virgin Mary. Not all marigolds are medicinal. It is the calendula marigold which has massive health benefits. The flowers of *C. officinalis* contain carotenes, flavonol glycosides, triterpene oligoglycosides, oleanane-type triterpene glycosides, saponins, sesquiterpene glucoside and volatile oil. They contain many antioxidant carotenoids. It also contains salicylic acid. Calendula has been historically significant in medicine in many cultures, and it is still important in alternative medicine today.

#### **Marigold home remedies**

- For chilblains, soak hands and feet in a



warm infusion of marigold flowers to

which a spoonful of sea salt has been added.

- An infusion of marigold can be used as face wash in case of sunburns.
- Boil a handful of marigold flower heads in a litre of water. Cool, and use these as swabs on the skin lesions. This is a very effective home remedy for psoriasis.
- For varicose vein ulcer, bathe the ulcer with an infusion of marigold flowers, to get instant relief.
- Herbal tea made with marigold flower heads is said to be effective for scanty periods. Drink half a cup, two to three times a day.
- Marigold is useful in stomach upsets, ulcers, menstrual problems, eye infections, inflammations and wound healing.
- The plant is antiseptic. Its flower, when rubbed on the affected part, relieves pain and swelling caused by a wasp or bee.
- The flowers are also used to make a lotion for sprains and wounds.
- The water distilled from marigold flowers is good for sore eyes, while the infusion of fresh flowers is beneficial in fever.
- Marigold is used to treat alopecia, bladder and kidney problems, blood in the urine and uterine bleeding.
- The plant is used for abdominal cramps and constipation.
- Marigold is good for treating bedsores, chapped lips, leg ulcers, persistent ulcers, bruises and varicose veins.
- It is used during aromatherapy, as a skin treatment.
- Marigold cream treats haemorrhoids and infant bums to help fight diaper rash.
- It serves as an excellent mouthwash after tooth extraction.
- It was used to detoxify the liver and gall bladder. The flowers were applied to cuts and wounds to stop bleeding, prevent infection and speed healing.
- **Lutein**, an antioxidant extracted from marigold may reduce tumors in the breast and prevent new cancers from developing, says a study by researchers from State Washington University. Marigold has also been found to be effective against leukemia, colon and melanoma cancer cells. Dietary Lutein from Marigold Extract Inhibits Mammary Tumor Development.

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## कृषक महिलाओं का योगदान एवं चुनौतियाँ

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भारत कृषि प्रधान देश है। ग्रामीण जनसंख्या का 90% भाग कृषि रोजगार से जुड़ा है जिसमें महिला कृषकों का योगदान पुरुषों के बराबर है। कृषि के क्षेत्र में पिछले कुछ वर्षों में महिलाओं का योगदान बढ़ा है। कृषि क्षेत्र के सभी कार्य कृषक महिलाओं द्वारा किये जाते हैं। बुवाई से लेकर कटाई, छटाई, बीजाई तक में महिलाओं का योगदान सराहनीय रहा है। दैनिक मजदूरी से लेकर कृषि प्रबंधन तक में महिलाओं के योगदान को नजरअंदाज नहीं किया जा सकता है। देश की कृषि अर्थव्यवस्था को सशक्त बनाने में कृषक महिलाएं सक्रिय भूमिका का निर्वाह कर रही हैं।

### संकेत शब्द

कृषि के क्षेत्र में महिलाओं की क्रियाशील स्थिति, कृषक महिलाओं का महत्व, कृषक महिलाओं का कृषि कार्य में प्रतिशत, कृषक महिलाओं का स्वसहायता समूह में योगदान, कृषक महिलाओं की कार्य स्थल संबंधी चुनौतियाँ, कृषक महिलाओं की स्वास्थ्य संबंधी चुनौतियाँ, कृषक महिलाओं की आर्थिक चुनौतियाँ, कृषक महिलाओं को प्रशिक्षित एवं सशक्त बनाने के उपाय।

वैज्ञानिक कृषि तकनीकी के युग में आज भी कृषक महिला योगदान कृषक प्रधान देश के विकास की प्रगति के निर्धारण का महत्वपूर्ण मापदण्ड है। विगत कुछ वर्षों के आकड़ों से यह पता चलता है कि कृषि क्षेत्र का दायरा व्यापक हुआ है, जिससे इस क्षेत्र में महिलाओं की सहभागिता भी और अधिक बढ़ी है। इस परिवर्तन को लक्षित करना

प्रस्तुत शोध आलेख का उद्देश्य है। शोध प्रविधि के अन्तर्गत -द्वितीयक एवं प्राथमिक स्रोतों से तथ्य संकलन सैद्धान्तिक तथा व्यवहारिक धरातल पर ग्रामीण कृषक महिला के योगदान के क्षेत्रों एवं चुनौतियाँ को विश्लेषित करने का प्रयत्न किया गया है। प्राक्कल्पना कृषक महिलाओं के योगदान को लक्षित करते हुए देश की प्रगति और विकास में कृषक महिला श्रम के योगदान उसकी भूमिका स्थिति चुनौतियाँ आदि बिन्दुओं पर सकारात्मक विमर्श अति आवश्यक है।

### अध्ययन का सैद्धान्तिक पक्ष

भारत देश में कृषक महिला योगदान की उपादेयता एवं प्रभाविता स्तर के अनुभाविक विश्लेषण का प्रयास करना। कृषि के क्षेत्र में महिलाओं की क्रियाशील स्थिति-ग्रामीण कृषक महिलाएँ कृषि के क्षेत्र में खेत की जुलाई से लेकर बीजों एवं फलों के चुनाव उने भण्डारण, बुवाई, रोपाई, गुड़ाई, खरपतवारों की निराई, खाद डालने, फसलों की कटाई, थ्रेसिंग फसलों के रखरखाव आदि के साथ-साथ पशुपालन के लिए चारा काटना, दूध निकालना, दूध से खोवा, घी, बनाना जैसे काम भी करती हैं। देश की अर्थव्यवस्था को सुदृढ़ करने हेतु कृषि में प्रत्येक स्तर पर तत्परता से लगी हुई है। कृषि कार्य के साथ-साथ लाख उत्पादन, रेशम पालन, नर्सरी तैयार करना, फलों और सब्जियों की खेती करना आदि कार्यों में कृषि उत्पादन से वह फार्म मैनेजर से लेकर भूमिहीन मजदूर तक की भूमिका में

क्रियाशील है। एक सर्वेक्षण के अनुसार कृषि क्षेत्र में क्रियाशील महिलाएँ पुरुषों की अपेक्षा तीन गुना कार्य करती हैं। भारत में हरित क्रान्ति के जनक एवं प्रणेता प्रसिद्ध कृषि वैज्ञानिक डॉ. एम.एस. स्वामीनाथन ने सन 1985 में एक सम्मेलन में बालते हुए कहा था कि पुरुष तो शिकार तथा भोजन के लिए निकल जाया करते थे तथा महिलाएँ स्थानीय वनस्पतियाँ के बीजों को एकत्रित करके उनकी खेती द्वारा खाद्य पशु चारा, रेशा तथा ईंधन भी सामग्री प्राप्त करने में लगी रहती थी।” 1

### कृषक महिलाओं का महत्व

कृषि प्रधान देश होने के कारण देश की अहम भूमिका रही है। भारत में ही नहीं संपूर्ण एशिया में महिला श्रम शक्ति का सर्वाधिक उपयोग कृषि कार्य में ही होता है। स्वयं के खेतों में कृषि का काम करने में फल, सब्जियों के उत्पादन में कृषि उत्पादन के क्रम में प्रबंधक के तौर पर महिलाएँ कार्यरत हैं।

कृषक महिलाओं का कृषि कार्य में प्रतिशत भारतीय कृषक महिलाओं का प्रतिशत जो कृषि कार्य में लगी हैं। देश की आबादी का 70% ग्रामीण भूमि संसाधनों से ही आजीविका पर निर्भर है। जिसमें 85% आर्थिक रूप से सक्रिय महिलाएँ हैं। धान की खेती में सर्वाधिक 80% कार्य महिलाओं द्वारा किया जाता है। “एक सर्वेक्षण के अनुसार 1 हेक्टर खेत में 1 वर्ष में 1 जोड़ी बैल 1064 घंटे पुरुष 1212 घंटे एवं महिला 3485 की भागीदारी 90% तक है। पशु पालन के क्षेत्र में महिलाओं की भागीदारी 90% तक है।

कृषक महिलाओं का स्वसहायता समूह में योगदान

स्वसहायता समूहों के निर्माण की योजना भारत सरकार का क्रान्तिकारी कदम है। इसके जरिये महिलाएँ आर्थिक, आत्मनिर्भरता के साथ-साथ सामाजिक स्थिति बदलने में स्वयं भी अपने उत्थान के प्रति संकलित हैं। “2010-11 के दौरान महिला किसान सशक्तिकरण योजना शुरू हुई, जमीन, पानी, प्रौद्योगिकी, ऋण सुविधायें, बीमा तथा विपणन की जरूरतें पूरी हो। 12वीं पंचवर्षीय योजना में महिला किसानों के लिए एक केन्द्रिय कृषि कोश की स्थापना जाये जिसमें उपयुक्त योजना कार्यान्वित हो। छठी पंचवर्षीय योजना (1980-85) के दौरान महिलाओं के विकास का पहला अध्याय शुरू हुआ था।”

वर्तमान में स्वसहायता समूह योजना के अन्तर्गत ग्रामीण अनुसूचित जाति, जनजातियों को प्रशिक्षण के द्वारा शिक्षित कर रोजगार के अवसर विकसित किए जा रहे हैं। जिसमें महिला भागीदारी का प्रतिशत तेजी से बढ़ रहा है। ग्रामीण कृषक महिलाएँ प्रशिक्षण प्राप्त कर स्वसहायता समूह द्वारा संचालित स्व रोजगार में अपना महत्वपूर्ण योगदान देते हुए एक सुदृढ़ आर्थिक स्थिति को प्राप्त कर रही हैं। इन स्वरोजगार संचालित पशुधन, सब्जियों की खेती, फूलों की खेती, रतनजोत की खेती, मशरूम की खेती, पशु-पालन, औषधि पौधों की खेती, खाद्य उद्योग के क्षेत्र, मुर्गी पालन, वनोपज संग्रह, चारहाग विकास, रेशम उत्पादन, लाख उत्पादन उद्यानिकी विकास आदि सफल गति-विधियों के रूप में क्रियान्वित की जा रही है।

इन उपरोक्त स्व-सहायता समूह योजना के उपरोक्त आर्थिक पक्ष के अतिरिक्त दूसरे सामाजिक पक्ष के अन्तर्गत इन परिवारों में अपने

अधिकार और कर्तव्यों के प्रति जागरूकता बढ़ी है।

**कृषक महिलाओं की कार्य स्थल संबंधी चुनौतियां** खेतों में कार्य करते हुए कृषक महिलाओं को जलवायु परिवर्तन से उत्पन्न समस्याएँ आदि से संघर्ष करना पड़ता है। फसल उत्पादन करते हुए उन्हें भी मौसम की मार झेलनी पड़ती है। गर्मी के मौसम में लू लगना, निर्जलीकरण, सनबर्न, सिर दर्द आदि। वर्षा ऋतु में आकाशीय बिजली का प्रकोप झेलना, दुर्घटनाग्रस्त होना, सांप एवं जहरीले कीड़ों से प्रभावित होना, कीटाणु संक्रमण, फंगल संक्रमण आदि का आक्रमण होना। शीत ऋतु में ठण्ड लगना, हाथ-पैर जाम होना, बुखार आदि इसके साथ ही कृषि स्थल पर कृषि यंत्र जैसे हार्वेस्टर थेसर, ट्रैक्टर या अन्य कृषि उपकरणों जैसे तेज काटने वाले उपकरण या छोटे-बड़े उपकरणों से दुर्घटना की अशंका हमेशा बनी रहती है। अतः महिला कृषकों को कार्यस्थल पर इन सब चुनौतियों का सामना करना पड़ता है।

**कृषक महिलाओं की स्वास्थ्य संबंधी समस्याएँ** खेतीहर महिला कृषक कृषि रसायनों जैसे फफूंदनाशक, कीटाणुनाशक, खरपतवारनाशक, रसायनिक खाद अन्य से प्रत्यक्ष या अप्रत्यक्ष रूप से प्रभावित होना। जिससे शरीर में एलर्जी अस्थमा, साँस लेने में तकलीफ, त्वचा परदाग, या दाने त्वचा में जलन, आँखों में जलन आदि लक्षण से प्रभावित होती है। रसायनों के छिड़काव की सही विधि ज्ञान न होने के कारण तीव्र जहर के लक्षण, प्रजनन पर प्रभाव, कैंसर जैसी बीमारी होती है। जानवरों के मलमूत्र के संपर्क में रहने से स्वास्थ्य पर बैक्टीरिया कीटाणु संक्रमण, परजीवी संक्रमण आदि का आक्रमण देखा जाता है।

अस्वच्छकर वातावरण में काम करने के कारण एवं अपर्याप्त पोषण के कारण खेतिहर महिलाओं में कुपोषण की समस्या उत्पन्न हो जाती है। हानिकारक पौधे या कीड़े मकौड़े से प्रभावित होना। लम्बे समय तक एक ही स्थिति में बैठने, खड़े होने पर थकान, सिरदर्द, पीठदर्द, कमरदर्द, माँसपेशियों खींचना आदि लक्षण देखे जा सकते हैं।

**कृषक महिलाओं की आर्थिक चुनौतियां**

जनसंख्या एवं श्रम शक्ति का एक प्रमुख भाग हाने के उपरान्त भी खेतीहर महिलाएं न सिर्फ उपेक्षित हैं बल्कि अत्यधिक शोषण की शिकार भी है। कृषि कार्य में अत्यधिक क्रियाशील रहने के बावजूद उन्हें श्रमिक वर्ग क दर्जा नहीं दिया जाता है। अधिक घंटे कार्य करके भी वे अपनी तथा परिवार की न्यूनतम आवश्यकताओं की पूर्ति नहीं कर पाती हैं। कृषि क्षेत्र में महिलाएं पुरुषों के बराबर काम करती हैं इसके बावजूद दिहाड़ी और नकद भुगतान पुरुषों की तुलना में कम होता है। मौसमी रोजगार, ऋण ग्रस्तता, वैकल्पिक रोजगार, अवसरों का अभाव, कृषि के यंत्रीकरण से बढ़ती बेरोजगारी तथा संगठन का अभाव उनकी प्रमुख समस्याएं हैं। महिलाओं के लिए समान मजदूरी दरों का निर्धारण न होना तथा कानूनी प्रक्रिया संबंधी सशक्त प्रावधानों के न होने से यह समस्या बनी है। कृषक महिलाओं को प्रशिक्षित एवं सशक्त बनाने के उपायः

- कृषक महिलाओं को प्राथमिकता के आधार पर कृषि विस्तार कार्य में लगाया जाना चाहिए।
- खेतिहर महिलाओं में उनके कार्यक्षेत्र से संबंधित तकनीकी शिक्षा के प्रसार के लिए

स्वयं करो और सीखो वाली शैक्षिक विधि का प्रयोग शामिल किया जाना चाहिए।

- कृषक महिलाओं के सशक्तिकरण के लिए निरक्षरता का उन्मूलन अत्यंत आवश्यक है।
- ग्रामीण कृषक महिलाओं को आधुनिक तकनीकी से परिचित करने हेतु विशेषता प्रशिक्षण कार्यक्रम चलाया जाना चाहिए।
- कृषक महिलाओं को कृषि संसाधन एवं पूँजी समय पर निशुल्क ऋण सुविधा उपलब्ध कराई जाये।
- स्वयं सहायता समूह सरकार की ओर से एवं नाबार्ड द्वारा प्राप्त सुविधाओं का उपयोग करते हुए अपने क्षेत्र के लिए उपयोगी उन्नत कृषि तकनीकी को अपनाया जाये।
- कृषक महिला सशक्तिकरण हेतु समान काम, समान भुगतान की व्यवस्था होना चाहिए।
- सरकार को ग्रामीण स्तर पर कृषक महिलाओं की स्वास्थ्य समस्याओं का कैम्प लगाकर निवारण किया जाए।
- कृषि के माध्यम से रोजगार का साधन उपलब्ध कराने का प्रयत्न किया जाना चाहिए।
- कृषि प्रबंधन के साथ-साथ महिला कृषकों को विपणन बाजार की सुविधा उपलब्ध करायी जाये।

कृषि क्षेत्र में महिलाओं पर केन्द्रित अन्तर्राष्ट्रीय सम्मेलन ग्लोबल कान्फ्रेंस ऑन वीमेन इन एग्रीकल्चर 13 से 15 मार्च 2012 तक नई दिल्ली में आयोजित की गई। कृषि में समावेशी विकास हेतु महिलाओं के सशक्तिकरण के लक्ष्य को लेकर आयोजित इस सम्मेलन का प्रयोजन भारतीय कृषि अनुसंधान परिषद (आई सी ए

आर) और नई दिल्ली के साथ अन्य संस्थाओं के द्वारा मिलकर किया था।”

खाद्य एवं कृषि संगठन (एफ ओ) की 2011 की रिपोर्ट के अनुसार विश्व की कुल जनसंख्या में महिला किसानों की संख्या एक चौथाई से अधिक है। विकासशील देशों में कृषि श्रमिकों का 43% दक्षिण अमेरिका में 20% महिलाएं किसानी करती हैं। अफ्रीका के अन्य देशों एवं पूर्वी एशिया के कृषि क्षेत्रों के श्रमिकों में 50% हिस्सा महिलाओं का है। समर्थ महिलाओं की भागीदारी से कृषि उत्पादन में 2.5% से लेकर 4% तक की वृद्धि संभव हो सकती है। विश्व के भूखे लोगों की संख्या में 12% से लेकर 17% की कमी आ सकती है। इसके अतिरिक्त महिलाओं की आय बढ़ेगी वह अलग है।”

खेतिहर कृषक महिलाओं हेतु कुछ कम लागत तकनीक से प्रशिक्षित किया जाये जैसे बीज से संबंधित बीज किस्म का चयन भण्डारण, सफाई ग्रडिंग अंकुरण प्रशिक्षण बीजोपचार करना। इसके अतिरिक्त महिला कृषकों की चुनौतियों को कम करने हेतु कुछ विशेषण के विषय अपनाये जा सकते हैं जैसे-बीज उत्पादन, मधुमक्खी पालन, वर्मी कम्पोस्ट उत्पादन, पौधे संरक्षण हेतु नीम से पेस्टीसाईड उत्पादन, नील हरित काई उत्पादन, लाख उत्पादन, मशरूम उत्पादन, फल एवं सब्जी परिरक्षण, जैविक खाद बनाने हेतु प्रशिक्षण, फल सब्जी उत्पादन, फल पौधे रोपण, पशु आहार-भूसे का यूरिया से उपचार आदि के द्वारा भी महिला कृषकों के योगदान को बढ़ाया जा सकता है तथा मौसम एवं परिस्थितियों से उत्पन्न चुनौतियों को कम किया जा सकता है।

**सन्दर्भ ग्रंथ**

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## Trap cropping: a tool of pest management

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Managing pests is one of the biggest challenges faced by the farmers. Losses caused by insect pests can lead to important losses to them. The therapeutic approach of killing pest organisms with toxic chemicals has been prevailing pest control strategy for many years. An excellent alternative to the indiscriminate use of insecticides is the implementation of integrated pest management which is a comprehensive and environmentally friendly approach to solving pest problems that relies on a combination of general preventive practices.

Trap cropping is the planting of a trap crop to protect the main crop from a certain pest or several pests. The trap can be from the same or different family group than that of the main crop as long as it is more attractive to the pest.

The principle of trap crop relies on pest preference for certain crops or stages of crop growth. Two preliminary techniques used in trap crops are:

- a) Selection of more preferred species
- b) Planting of the same crop before the main crop so that preferred stage of development will arrive earlier than the main crop.

Advantages of trap cropping:

- Enhance biodiversity.
- Increase productivity.
- It can be integrated with existing farming/gardening practices.
- Conserves or attracts natural enemies.
- Reduces pest incidence to manageable levels.

- Reduces dependence on chemical pesticides.
- Improves the crop's quality.
- Helps conserve the soil and the environment.
- Disadvantages of trap cropping:
- Timely management of insects in trap crop.
- Insecticides may still be needed.
- Need for additional planning such as early planting and resources like land, labour, capital seeds etc.

### Types of trap crops

Trap crops can be classified based on spatial distribution and characteristics of trap crops

#### Based on spatial distribution

Trap crops can be arranged in various spatial patterns and the choice of design will depend on target pests, pest pressures and garden or farm size. Some of the spatial arrangements include

#### Perimeter trap cropping

It is the most popular trap cropping



**Perimeter trap cropping system:  
Sorghum as a trap crop around tomato.**

arrangement used by the farmers. Perimeter trap crops can be planted around the borders of the main crop. The effectiveness of the crop technique can be improved by adding the other perimeter defenses like biological, mechanical cultural or chemical control tactics (i.e. border sprays) or with pest attractants and repellants. The technique may not always eliminate the pest completely, but it can substantially reduce their populations on the main crop.

### **Sequential trap cropping**

This modality involves trap crops that are planted earlier and/or later than the main



### **Sequential trap cropping: Sorghum as a trap crop around tomato**

crop to enhance Sequential trap cropping the attractiveness of the trap crop to the targeted insect pest.

**Ex.** Indian mustard as a trap crop for diamond back moth in Cabbage.

### **Multiple trap cropping**

Planting of several species simultaneously as trap crops with the purpose of either managing several insect pests at the same time or enhancing the control of one insect pest by combining plants for attracting pests. For ex. use of a mixture of castor, millet, and soybean to control Groundnut leaf miner and the use of corn and potato plants combined as a trap crop to control wireworms in sweet potato fields.

### **Push – pull trap cropping**

This strategy is based on a combination of a trap crop with a repellent intercrop. The trap crop attracts the insect pest and, combined with the repellent intercrop, diverts the insect pest away from the main crop.

**Ex.** Marigold and Onion in Chilli. A push-pull strategy based on using either Napier or Sudan grass as a trap crop planted around the main crop, and either Desmodium or Molasses grass planted within the field as a repellent intercrop, has greatly increased the effectiveness of trap cropping for stem borers.

### **Based on characteristics of trap crop**

#### **Conventional trap crop**

It is most general practice of trap cropping, in which a trap crop planted next to a higher value crop is naturally more attractive to a pest as either a food source or oviposition site than is the main crop, thus preventing or making less likely the arrival of the pest to the main crop and/or concentrating it in the trap crop where it can be economically destroyed.

**Ex:** Castor and Marigold in Ground nut crop, Alfalfa as a trap crop for Lygus bugs in Cotton.

#### **Dead end trap cropping**

Trap crops which are highly attractive to insects but they or their offspring's cannot survive. Dead-end trap crops serve as a sink for pests, preventing their movement from the trap crop to the main crop later in the season. Also these trap crops should be located where they can intercept insect pests (e.g., field borders) and reduce pest damage in the main crop.

**Ex:** Indian mustard for Cabbage diamond back moth, Sun hemp for Bean pod borer.

**Genetically modified trap cropping-** Crops are genetically modified (i.e., the deliberate

Manipulation of genes through the use of biotechnology) to attract pests.

**Ex.** Genetically engineered (Bt.) Potato for Colorado Potato beetle.

**The important trap crops used in pest management:**

- Sesamum is commonly used as trap crop to attract Diamondback moth in both cabbage and cauliflower .Two rows of sesamum for every 25 rows of cabbage or cauliflower can be planted to trap the pest.
- In groundnut, castor or sunflower can be used to attract leaf eating caterpillar on the border of the field.
- In tomato marigold or cucumber is commonly used as trap crop for every

15 rows of the main crop against leaf minor.

- Marigold is a potential trap crop in potato against nematodes.
- To trap corn stalk borer in maize sorghum has been exploited as trap crop.
- In gram, coriander or marigold can be used as trap crop for management Gram pod borer.

Trap cropping has indicated benefits in terms of economic returns on an average of 10-30 per cent increase in net profits mainly resulting from reduced insecticide use and pest attack. It is a useful strategy in managing several pests in various cropping system.

## Know your biodiversity

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### ***Cannabis sativa* (Bang)**

*Cannabis sativa* is herbaceous plant belongs to family Cannabaceae. It is commonly known as Hemp, Marijuana, Ganja and Bang. It is native of Central Asia and NW. Himalaya, Hazara, Baluchistan, Temperate and Tropical Regions of the World. In India it is found in NW. Himalaya, almost throughout India. Cannabis is one of the oldest known medicinal plant and described in almost every ancient handbook on plant medicine. It is commonly found in shrubberies, waste lands, farmyards, ditches, roadsides, moist fertile soils, near edges of cultivated fields and village houses. Species was first described by Carolus Linnaeus in 1753.

It is cultivated in hilly regions of Himachal Pradesh in Chamba, Kullu, Kinnaur, Sirmaur and Shimla districts. It is the main cash crop for the people residing in Malana region of Kullu district of Himachal Pradesh. Malana is mass producer of Cannabis and charas of Malana region known as 'Malana cream' is considered to be best quality throughout India.

It is an erect large, annual to perennial, aromatic herb. Stems erect, grooved, branched and tomentose. Leaves stalked palmate, lanceolate-oblong. The middle one longest and wedged-shaped, Flowers small, pale-yellow-green. Male and female on separate and dissimilar plants. Fruits grayish-brown or yellowish. Seeds flattened. Flowering and Fruiting season is March-October.

Physiologically active chemical compound 'Cannabinoids' is found in this plant and it is generally consumed for recreational, medicinal and spiritual purposes. Hashishn or Charas is obtained from this plant and it consists of the resinous exudation collected from the leaves; resinous secretion appears shortly before the formation of flowers. Ganja is obtained from dried flowering and fruiting tops of female plants from which resin has not been removed. Hemp is also obtained from fibrous stem. Many volatile terpenes and sesquiterpenes are responsible for its characteristic aroma.

It is a sacred plant and leaves are offered to Hindu God 'Shiva'. Fibers of the stem are used for making ropes and cross-strings of the grass shoes. Leaves are used as aphrodisiac, antidiarrhoeic, astringent to bowels, tonic, stomachic, intra-ocular hypertension, menstrual disorders, labour pains and useful in "Kapha", leprosy. *Cannabis* is recommended as a psychiatric aid in treating depression and high blood pressure. Fine paste of the leaves with beetle nut and jaggery, roasted in 'desi

ghee' is used to make pills for stomach pains and diarrhoea. Fruits of this plant are eaten as chatani and used as food for cage-birds.

Most of the hill people are engaged in Cannabis cultivation and trade. These high altitude areas are still not connected with the roads hence inspection of these villages are very difficult. Production of cannabis needs little hard work and income is more in short duration hence villagers are engaged in earning their lives through Cannabis cultivation. Possession of Cannabis is illegal in India but personal use in small quantity is tolerated. To control the psychoactive drugs trafficking, general public awareness about the adverse effect of Cannabis and alternate income generating activities is very necessary along with training on income generating skills.



### ***Bos mutus* (Yak)**

*Bos mutus* is commonly known as wild Yak. It is long haired bovid found in Tibet and Central Asia. Yak is one of the local inhabitants of cold desert lives in harsh and barren areas at altitude of 4000 m - 6000 m. Wild Yak global population has probably declined by over 30 % in past 30 years. This species is extinct in both Nepal and Bhutan. Generic name '*Bos*' means an ox and species name '*mutus*' means 'mute'. Wild Yak is also domesticated

about 2000 years ago and known as *Bos grunniens* by Linnaeus in 1766. Wild Yak is generally larger than domesticated Yak. It is herbivorous. Body is large and strong. Size of the female is smaller than males. Both male and female have a horn which grows out of the side of the head and curve upwards halfway along their length. Horns of the female are shorter than males. Thick long hair covers the whole body and colour of the hair is jet brown or black. Wild yak prefer to live in herd of ten or even hundreds of animal. It has very acute sense of smell.

Life span of Yak is 23 years. It is polygynous and breeding season is July–September. It give birth to only one calf at a time and gestation period is 260 days. Yak can tolerate temperature up to 40<sup>0</sup> C. It feed mostly in morning and evening and travels long distance due to scarcity of vegetation. It is very sensitive to heat and moves seasonally to avoid higher temperature.

It is well adapted for life in the cold because of thick coat and low number of sweat glands which helps to conserve body heat. It has large lung capacity and small and numerous blood cells which enables it to get oxygen from thin mountain air. Yak secrete a special sticky substance in their sweat which keep their under-hair matted and provide extra insulation in very low temperature conditions.

Population of wild Yak is declining at very fast rate because of their decreasing habitat and hunting. Besides of meat, fiber, milk and hide Yak is also used as beasts of burden. Interbreeding between domestic yak and wild yak, habitat loss due to pastoralist and transmission of diseases from domestic livestock to wild yak is also responsible for its declining population. Wild yak is classified as Vulnerable in

IUCN Red List. It is listed in appendix I of the Convention on migratory Species. It is also listed under Schedule I of the Indian wildlife protection act 1972. In situ and ex situ conservation is very necessary for conservation of this species.

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