

Enhancing the sustainable horticultural efficiency in degraded lands for Kandi areas

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The management of degraded lands to improve farm income in *Kandi* (less water) areas is quite challenging due natural calamities. Under such brittle environment sustaining the livelihoods of these resources poor farmers become a real challenge both for technology developers as well as strategy makers. In the *Kandi* area the land shaping technique, particularly farm pond and undulating topography, poor soil fertility status, deep and scare ground water level, are unique technology for addressing the key challenges like land degradation heavy drainage and scarcity of water for irrigation and in turn have the potential to enhancing production, productivity, income and employment. Rainfall is the only source of water which is erratic with unprecedented frequent draughts affecting fruit production. These techniques particularly farm pond, water harvesting, drought tolerant variety and agronomic practice are a financially practicable and gorgeous proposal for the degraded lands in *Kandi* areas.

India has made fairly good progress on the horticultural crops of the world and is today the second largest producer of fruits in the world, falling behind China. India accounts for 10 per cent of the total world production of fruits, fruit production increased five times and eight times since independence from 55 lakh tonnes in 1952 – 53 to 286.32 tonnes in 1991-92 and 440.42 tonnes in 1998-99. However, the productivity of these fruits is significantly low as compared to other fruit growing of the countries. This is mainly reason due to undulating topography, poor soil fertility status, deep and scare ground water level are the main characteristics of rainfed areas of Jammu region. In *Kandi* areas, the rain is the only source of water which is erratic with unprecedented frequent draughts affecting fruit production in these areas. In adequate and improper water management practices that lowers down the soil fertility of orchards, especially in *Kandi* / rainfed areas.

Conservation of soil moisture by application of mulches becomes essential for portable cultivation under

rainfed condition. In spite no assured irrigation in these regions, the moisture conservation technique is not in practice. Mulches not only conserve soil moisture but also impart manifold beneficial effect, like suppression of extreme fluctuation of soil temperature, reduce water loss through evaporation, resulting more stored soil moisture and maintenance of soil fertility. The water scarcity conditions, irrigation are the most suitable option for water management. The requirement of water through mulch can further be reduced by using locally available organic materials as mulches which not only saves irrigation water but also conserves soil moisture. Continuous use of organic mulches are helpful in improving the physico-chemical properties microbial flora and soil aeration which ultimately resulted into better growth and yield of plant. Moreover, mulching by plastic polyethylene has proved its effectiveness in conserving the soil moisture and increasing the growth, yield and quality in different citrus cultivars. Although, the soils fertility status in terms balance dose of fertilizer and management practices, which will help in formulating site specific balance fertilizer recommendations and awareness about the orchards management by farmers have a detrimental influence over quality and yields of fruits in rainfed orchards. Hence there is need to harvest rainwater, farm pond and conserve soil moisture management techniques/ practices to enhance the water productivity which will further help in raising nutrient use efficiency and thereby enhancing fruit production.

Integrated horticultural management practices:

Some of the fruit crops in degraded lands in *Kandi* areas can be grown successfully by few modifications and adoption of modern management practices which are enumerated as under:

Use of farmyard manure in relation to fruit cultivation: *Kandi* areas are in these soils of sandy loam. The sandy loam soil is poor organic matter content

generally get compacted and affect the seedling emergence and crop growth. The water holding capacity of the sandy soil is very poor due to high infiltration rate. Contrary to this, in salt affected soil, the infiltration rate is poor and physiologically moisture is not available due to exo-osmosis. Continuous use of application in farmyard manure shall be helpful in improving the organic matter content of the soil and thus will result in improving microbial action and its water holding capacity.

Use of pond sediments in relation to fruit cultivation: *Kandi* areas where scarcity of water is the major problem in these regions. The water table at 500 -550 level is not available in nearby 6 to 7 kilometers. Ponds and talab are scattered in villages used to be the major source of drinking water for animals/human beings and supply of crops. They get dry during summer and their sediments can be used for raising the productivity of the soils in the Jammu regions. Its application improves the moisture regimes in retention capacity of soil. It also increases nitrogen and organic matter content of soil.

Popularization of *in-situ* orchard establishment : It is a matter of common experience that seedling plants have better and well developed root system. Thus, it is advisable to sow the seeds or transplant poly bag / poly tube / root trainer, raised seedlings after the pit preparation. After the establishment of the plant, grafting / budding with scion shoots obtained from 'elite clones' need to be carried out in the same or next year. This practice shall encourage better plant establishment, besides cheaper for adaptations in these regions.

Mulching in relation to fruit cultivation : Covering of plant basin with organic waste materials, black polyethylene strips or emulsions is termed as mulching. Mulching reduces the evaporation by cutting radiation



falling on the soil surface and thus delays drying and reduces soil thermal regime during day time. It also reduces the weed population and improves the

movement of soil by improving the environment along the root zone. Continuous use of organic mulches shall be helpful in improving the organic matter content of soil and

thus the water holding capacity of soil shall also improve. In citrus species, aonla, ber, mango, phalsa and guava mulching of tree basin with farmyard manure, paddy straw, bajra straw, branker (*Adhotada vassica*), grasses, groundnut husk and locally available mulches materials have shown positive response in maintaining optimum moisture conservation, weed control, improving physical and chemical properties of sandy loam soils and thus inducing better growth and yield. Use of inorganic mulches (white, black and colour polyethylene strips) is expensive and it does not incorporate organic matter content in the soil.

Water harvesting in relation to fruit cultivation: Water harvesting is one of the very older practices of



collecting water in depressions for crop cultivation and consumption purposes.

These practices of converting more rain water into soil water. Rain water either can be diverted to tree basin *in-situ* or in suitable structures *ex-situ* which can further be utilized as life saving irrigation. In sandy soils *in-situ* conservation while in heavier soil *ex-situ* conservation should be popularized.

The water thus collected remains stored deep into soil profile, escapes from evaporative losses and is obtainable during critical stage/ time of demand. Water harvesting tank different cropped area ratios and degree of slopes has been tried at Regional Research Sub Station, Raya, SKUAST-Jammu. The catchment has been found to be appropriate for conservation and proper utilization of rain water. Percentage slope and catchment area have been advocated for fruits like nursery areas fruit saplings, mango, guava, bael, Karonda, Kinnow, pomegranate, guava, fig, lassora, aonla, custard apple.

Conclusion : In *Kandi* areas the land shaping techniques is a unique technology for addressing the key challenges like land degradation, drainage congestion and scarcity of water for irrigation and in turn have the potential to



Fig. 1 : Custard apple, Karonda, Phalsa, Kinnow and Mango (deep rooted plants)

enhancing production, productivity, income and employment. These techniques particularly farm pond and water harvesting and are financially viable and attractive proposition for the *Kandi* areas. In addition to that, agronomic strategies and drought tolerant varieties of crops under poor soil fertility have shown better performance and can be used for obtaining high yield.

The techno-economic evaluations of these systems were evaluated. Therefore, these techniques may be adopted by the farmers of the *Kandi* areas depending upon the specific farmer field location.

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