



DIFFERENT STRATEGIES FOR GREENING HIGH ALTITUDE COLD DESERT REGION-LADAKH (J & K)

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ABSTRACT

Ladakh- a cold desert region is situated between 31-36° N latitude and 76-80° E longitude with an altitude ranging from 2500 to 6000 m above mean sea level. Ladakh has the largest area in Jammu and Kashmir, which is dry barren. Cloud bursts triggered floods caused wide spread damage not only to wastelands but also to agricultural lands and buildings. To arrest the desertification and to maintain an ecological balance, Govt. of India introduced Desert Development Programme in 1979. Rising of fast growing forest species like *Robinia pseudocacia* has proved beneficial in cold desert zone of Ladakh. Seabuck thorn or sarbong (*Hippophae ramnoides* Linn) which was previously used only for fuel wood or hedges along the agricultural fields, is now being cultivated on large scale.

KEY WORDS: Ladakh, Cloudburst, desertification, Sea buckthorn, cold desert.

INTRODUCTION

The cold desert region of Ladakh covers about 24,205 ha of cultivated area. The soils of the region are coarse textured, shallow, sandy, derived from weathered debris of rocks, subjected to severe wind erosion, have high permeability, low water holding capacity and low organic carbon (Sharma 2000). Ladakh is situated in the trans-Himalayan cold arid region and lies between 31°-36° N latitude and 76°-80°E longitude at an altitude of 11,300 to 18,000 ft. above MSL (Sharma 2000). Barley (*Hordeum vulgare*), wheat (*Triticum aestivum*) and alfalfa (*Medicago sativa*) are major crops, which cover 83% of the total cultivated area. The waste land of the cold desert of Ladakh was further aggravated owing to floods during August 18, 2006 and between the nights of August 5 and 6, 2010. The incessant rains in the cold desert of Ladakh on August 18, 2006 and cloud bursts triggered floods which caused wide spread damage not only to wastelands but also to agricultural lands and buildings (Gupta et al., 2012) vis-a- vis loss of human lives. Hence, an attempt was made to assess the methods for greening the cold desert.

MATERIALS & METHODS

Ladakh has an extremely harsh environment and one of the highest and driest inhabited places on earth. Ladakh's climate is referred to as a "cold desert" climate due to its combined features of arctic and desert climates. These include wide diurnal and seasonal fluctuations in temperature, from -40°C in winter to +35°C in summer, and extremely low precipitation, with an annual 10cm to 30cm primarily from snow (Demenge, 2006). Due to high altitude and low humidity, the radiation level is amongst the highest in the world (up to 6-7 Kwh/mm). The soil is thin, sandy and porous. These combined factors explain why the entire area is nearly devoid of vegetation, with the exception of valley floors and irrigated areas (Demenge,

2006). In the morning of August 6, 2010 an unusually strong thunder storm hit the Ladakh, causing massive flash floods that left 165 dead and many missed (Gupta et al., 2012). The most extensive loss of life occurred in Semislum area on the eastern edge of Leh. Besides, a number of villages and farms beyond Leh were also seriously affected with a collapse of hundreds of houses and buildings. Agricultural fields and other lands had been washed out and irrigation canals severely eroded along with agricultural lands. Not only were this many of the agricultural lands covered with infertile muds. The survey on the status of green vegetation and/or greening was conducted in Leh and Kargil districts of J&K. Eight villages from Leh district (Skurbuchan, Achinathang, Domkhar, Dha-Beema, Khaltsi, Nimmo, Basgo, Saspol) which are located around the famous river, *Indus* and most villages like Hardass, Sanjaq, Batalik, Trespon and Saliskot in Kargil district located near L.O.C which remains land locked for more than six months in a year. were purposively selected and the investigations were made through multiple field visits, questionnaires and interviews with elderly people.

RESULTS & DISCUSSION

Because of the geographical factors, the land of cold desert of Ladakh is devoid of moisture and generally wears a deserted look and has zero vegetation at the higher elevations. In the light of the above, the first and the foremost task of greening this land was entrusted to the Desert Development Programme (DDP) during 1979. Its objective was to arrest the desertification and to maintain an ecological balance, and to create conditions conducive for raising the level of production employment. The central Govt. used to allocate Rs. 150 lakh annually and upto 1990-1991 lot of greening work was done by DDP.

Pasture development

As Changthang area of Ladakh accounts for greater percentage of livestock population including Pashmina goats, so pasture development activities of DDP were confined to this area. An in-depth study regarding the scope of pasture development was undertaken. Behaviours of summer and winter pastures in the areas as also about the various grass species that could be grown in the area was also undertaken.

Vegetables and food crops

Tremendous development in vegetable cultivation was witnessed. Vegetables like cauliflower, cabbage, peas, onion, potato, turnip, radish, carrot and a large number of leafy vegetables are now locally produced on a large scale. A peculiar thing about these vegetables is their size i.e. 2-3 Kg cauliflowers or 3-5 Kg turnip is a common sight. Introduction of mini solar green houses was also started by DDP in collaboration with Indian Petro-Chemical Corporation limited as an alternative to an expensive large sized solar green houses. As a result now even during the peak of winters, vegetables are grown in these green houses. The development programme of the agency in this sphere included top working, budding, regeneration and development of nurseries.

Now despite 1400 ha of agriculture land damaged due to cloud burst on 5th – 6th August, 2010, cold desert area of Ladakh with its dependency for vegetables during off season has undergone a sharp transformation. It is through the technology evolved by DDP, DRDO (Defence Research and Development Organization), Department of Agriculture and SKUAST (Sher-e-Kashmir University of Agricultural Sciences and Technology). This development consists of new varieties of vegetables, manipulation to overcome the restrictions imposed by the climatic conditions and use of solar energy. The region is now producing more than 80 tuber and leafy vegetables in summer in fields and even in winter a large number of vegetables are grown in green houses and semi underground trenches. In poly green houses, the farmers are growing vegetables like celery, parsley, melons, turnip, garlic and chenopodium.

Cultivation of fruits

Apple, pear, peach, plum, cherry, almond, walnut are the main fruits grown in the cold desert zone of Ladakh. Strawberry was introduced in late nineteen eighties, is now grown both indoor and in open for home consumption. Area under fruits cultivation has risen in Kargil district. Increase in area production during the last two decades has become possible due to introduction of sulphur fumigation and improvement of drying technique by the then RRL (Regional Research Laboratory) Jammu and extended by Horticulture Department through its field functionaries.

Cultivation of Crops

Although barley and wheat are the main food crops grown in the area yet a number of changes in the production technologies of field crops have now been suggested to increase their productivity (Sharma and Mir, 2000). For example, crop rotations like barley-buck wheat, barley-mustard, barley-ragi, have become popular in double cropped area. Mixed intercropping such as wheat +

mustard, barley + mustard, wheat + field pea and wheat + chick pea, have also found beneficial in increasing crop productivity.

Planting of trees

There is no doubt that most of the available land is accounted for agriculture. However, there is also lot of scope in forestry. Plantation of poplar and willow trees has been done along the road sides and on the banks of the rivers. Rising of fast growing forest species like *Robinia pseudocacia* has proved beneficial in cold desert zone of Ladakh. Besides spewing fresh air they are used as timber, fuel wood and fodder. Apart from this, lack of vegetation leads to extensive soil erosion. Even meager showers during rains wreaks havoc in washing out of top soil leaving behind pebbles, gravels and boulders.

Planting of Seabuck thorn

Seabuck thorn or sarbong (*Hippophae ramnoides* Linn) which grows gregariously in dry glacial moraines as well as along the rivers, was previously used only for fuel wood or hedges along the agricultural fields, is now being cultivated on large scale. The fruit of this species is being utilized for malnutrition of value added products. In Russia, fruits of this shrub have almost replaced grapes in the market because of their rich source in vitamins and other nutrients.

CONCLUSION

It can be concluded from the above discussion that the cold desert region of India i.e. Ladakh has known to be cold desert which features scanty erratic rainfall and most of the geographical area were dry barren lands. In addition to this, cloudburst followed by flash floods in August 2010 results in washout of the fertile top layer and covering it with infertile mud. To tackle such problems, there is a dire need to protect the pastures to increase herbage yield, introduction of clovers (red and white) and sea buckthorn to regenerate the degraded lands, scientific management of wastelands and financial support to organize self help groups. Also, more research should be carried out, mainly focussing on greening cold desert.

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