

Plant Science: Tree plantation under stress conditions: Experiences from southern drylands in Khyber-Pakhtunkhwa province, Pakistan - Khan and Sahibzada Irfanullah - P&D Department, Khyber-Pakhtunkhwa, Pakistan

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Abstract

There are more than 3 billion people globally living in drylands that cover 40% of earth's surface; ROBIN (2002). In Pakistan, the situation is severe with 75% of the country's area receiving less than 250 mm of annual rainfall; PMD (1998). Drylands in southern Pakistan are home to communities living in poverty and depending on livestock rearing for their livelihood. The subsistence agriculture is losing its importance under the effects of climate change i.e. uncertain rainfall and very low productivity. To fill the livelihood gap, local communities are increasing their livestock herds. Thus pressure on silvo-pastures is increasing resulting in degradation of natural resources and loss of soil fertility, a fact that adversely affects the livelihood of communities. These climate based ecosystem challenges have remained unanswered since long.

The Farm Forestry Support Project (FFSP) of the Intercooperation (IC) and Swiss Agency for Development & Cooperation (SDC), initiated collaboration with local communities to pilot adaptive agroforestry measures in 2014 in extreme dry region of Karak. Major elements of these measures included the strengthening of the agro-silvo-pastures using hillside ditches and sand dune stabilization techniques. The objective was to harvest, conserve and use rain water for recovering fodder vegetation and increase productivity of the area with minimum cost and hence support livelihoods. The activity was carried out with participation of civil society organizations and farmers' associations.

The results recorded in 2018 showed a profuse plant growth in terms of trees, shrubs and fodder crops with a potential to provide timber, fuel wood and fodder for livestock. Maximum harvesting of rainwater and conservation of moisture also

resulted in growth of natural grasses and shrubs. Within a short period of 5 years, plant growth in height and diameter of 6 meters and 20 centimeters respectively was recorded. The average vegetation cover of 45% and increase in soil organic matter and nitrogen content was also recorded. All this happened with a minimum cost of US\$ 82 per hectare. The rejuvenation of wells in few cases was an additional positive affect of the activity. On the other hand, an annual income of US\$ 735 per hectare from *Saccharum spontaneum* planted in sand dunes was a real benefit to farmers against other landuses in sand dunes.

The results of these pilot activities have provided options for adapting to severe and changing climatic patterns in the dryland ecosystem leading to providing a sustainable livelihood base. The involvement of pastoral communities is essential for sustainability of the system. Keeping in view the wide pattern of natural resource use (particularly the open grazing system in many arid countries of the region) it can be recommended to apply a landscape approach beyond the boundaries of a single community or land-ownership.

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