

Importance of Bio fencing in AF Systems

L. G. GIRI RAO

Acharya N. G. Ranga Agricultural University, Rajendranagar, Hyderabad – 500 030

The productivity of rainfed agro ecosystem is limited mainly due to the unpredictable weather aberration particularly the frequency, distribution and intensity of rainfall, soil based constraints such as undulating topography, shallow depth, poor fertility and limited water infiltration capacity, sparse vegetation cover during most part of the year and the animal population both wild and domesticated feeding on the limited forest, crop land and natural grassland resources. The cattle grazing further enhance soil degradation and also disturb the agro eco system.

These two problems can be safely tackled by establishing some kind of vegetative barriers in the form of live fences on boundaries of cultivated fields in the rainfed regions. In addition to serve as a guard against animal encroachment and moderating the soil and water erosion, planting trees, shrubs and bushes of economic value on the boundaries of agricultural fields will enhance crop diversification into medicinal aromatic and industrial products and also serve as food, fodder and fuel source during prolonged drought periods.

AICRP on agro forestry, ANGRAU conducted several trials on “developing live fencing systems for soil and moisture conservation, crop diversification and sustaining crop productivity in rainfed regions of Rangareddy and Warangal districts of Andhra Pradesh during 2002-06.

Survey on fencing practices revealed that 87% farmers in these two districts were adopting some kind of fencing practices. Out of which 74% were adopting biofencing practices. Among the biofence species, vitex nungundo (24.5%) was the most popular in Warangal district and Lantana (21.8%) in Rangareddy district. Acacia nilotica (19%) and prosopis Juliflora (13.6%) were the other popular species in these regions.

In Yacharam mandal of Rangareddy district, about 25% of the farmers were having barbed wire fencing costing huge amounts. Most of the farmers viewed that live fencing is very much essential primarily for protection against grazing animals and to a certain degree for the demarcation of field boundaries as the barbed wire fencing is costly. Most of the live fencing systems were consisted of mixture of trees and shrubs. The trees are neem, tamarind, babul, jamun etc. The shrubs are Lantana, Vitex nungundo, phyllanthus neruri, Agave sp. Opuntia sp. etc. As per the farmers experience, the crop loss was estimated from 10-30% due to stay cattle. Therefore farmers were growing pongamia on bunds of rice fields, they were using these tree leaves as green manure. The leaves of vitex nungundo are boiled and extract is given to mother immediately after delivery, to prevent after effects physically and to reduce body pains.

In Mulugu mandal of Warangal district, the predominant bio-fence species are vitis venifera, prosopis juliflora and borrasus besides neem, tamarind and mango. Due to biofences, the crop yield losses rainfed from 5-25%, maximum being from babul plantations and the minimum due to vitex nungundo.

The results of research on biofence systems at IACRP on Agroforestry revealed that

- a) Ridge planting was superior method of planting than flat method
- b) Among different species studied, the survival rates of Agave(64-78%), Lawsonia (54-72%) were superior to that of Carissa (38.57% and Murraya (24-50%).
- c) When evaluation of bio-fence was done in different topographic situations, their performance was comparatively good in lower reaches than at middle and upper reach.
- d) Canopy structure with respect to Lawsonia was maximum (80 to 88 cm) than Agave (62 to 67cm), Carissa (56 to 61cm) and Murraya (45 to 54cm) in both the years of planting under on farm conditions.
- e) The root spread of Lawsonia (88.4cm) horizontally was maximum than Agave (68.3cm), Carissa (55.8cm) and Murraya (43.5cm) while in case of vertical growth it was maximum with Carissa (57.3cm) followed by Murraya (45.2cm), Lawsonia (42.3cm) and Agave (34.5cm).
- f) The impact of bio-fence on crop yield was maximum with respect to Lawsonia than with Agave and other species. The mean yield loss recorded was ranging from 20-62 percent near the fence (0-2m) over the yield obtained at 2-4m away from the fence. Maximum yield reduction was observed in case of sorghum (62.5%) followed by maie (48%), Bengalgram (49%), groundnut (23%) and greengram (2.9%).
- g) There was maximum runoff with Lawsonia-Agave (1.42mm) and Lawsonia-Carissa(1.41mm) combinations. The corresponding soil loss with Lawsonia-Carissa combination was 0.0017 t/ha followed by 0.00073 and 0.0008 t/ha in Lantana – Carissa and Lantana – Agave combination, respectively.

Fertility changes due to incorporation of different leaves

The leaves of biofence species were incubated with soil maintaining moisture level to field capacity and the changes in fertility, improvement of soil was observed at different intervals. It was noticed that after 15 days of incubation, there was reduction in available nitrogen content, obviously due to immobilization of Nitrogen, whereas with respect to phosphorus and potassium where was significant improvement as compared to control. However, after 30 days period, there was improvement in fertility status of soil, with respect available N,P and K. Among different biofence species of which leaves were incorporated. Lantana showed highest available N status (280.4 kg ha⁻¹), while with respect to available P₂O₅ (23.2 kg ha⁻¹) and K₂O (286.1 kg ha⁻¹), Agave showed highest status followed by Lawsonia inermis. Further after 45,60 and 75 days of incubation, the available nutrients significantly increased and maximum being observes at 75 days.

Net returns expected from Lawsonia inermis through dry leaf marketing

After 21/2 years of growth, the dry leaf received from biofence of Lawsonia inermis was 347 kg/ha⁻¹ in one cutting. There will be at least two cuttings per year and each kg of dry leaf costs about Rs.20. The labour costs including initial costs, maintenance and collection of leaf will be about Rs.9,750/-. Therefore, from one hectare of biofence, a minimum of Rs.4,000/- can be obtained which is in addition to the crop yields.