NEW PROJECTS INITIATED DURING 2008-2009

PLAN PROJECTS

Project 1: Efficacy and economics of water harvesting devices in controlling run-off losses and enhancing biomass productivity in Aravalli ranges. (AFRI-39/EED/ 2005-09).

Status: Experiment was started in July 2005 with the financial assistance from Rajasthan Forest Department. A total 75 plots of about 700 m2 area were laid in 0-10, 10-20% and >20% with control, contour trench, gradonie, Box trench and V-ditch rainwater harvesting treatments.

Growth data recorded in July and December 2008 indicated plants were taller and thicker in <10% slope area and decreased with increase in slope. But *Holoptelia integrifolia* indicated highest, whereas, *Dendrcalamus strictus* and *Acacia catechu* showed lowest growth in 10-20% slope area. Growth of *Dendocalamus strictus*, *Azadirachta indica* and *Zyziphus mauritiana* was best in V-ditch area. *Embilca officinalis* and *Holoptelia integrifolia* performed best in contour trench areas, whereas, *G. arborea* and *Acacia catechu* performed better in Box trench areas.

Growth data of July 2008 indicated that seed sown seedling of *Acacia catechu* outperformed the planted seedlings of *E. officinalis*, *Syzigium comini*, *Zyziphus mauritiana*. In some of the cases, the difference is about 2-fold.

Soil water content increased downward but soil organic carbon (SOC), NH_4-N and NO_3-N were highest at mid position in a plot. Soil water content and soil organic carbon were highest in <10%, whereas, NO_3-N and NH_4-N concentrations were highest in >20% slopes. In RWH treated area, SOC and PO_4-P were highest in CT plots; SWC and NO_3-N were highest in G plots, whereas NH_4-N concentration was highest in VD plots. Lowest availability of soil nutrients indicated greater diversity.

Species diversity, richness and herbage yield increased downward, but species evenness was highest at mid position in a plot. Among slope species, diversity and species richness were highest in <10%, dry matter yield was highest in 10-20%, and species dominance and vegetation height were highest in >20% slopes. In RWH treated area, species diversity and herbage yield were highest in CT plots; whereas, evenness, richness and vegetation height were highest in VD plots. Lowest availability of soil nutrients indicated greater diversity.

There were 80 numbers of herbs and grass species recorded in October 2008. Number of species increased downward from >20% slope (5.33 m^{-2}) to <10% slope (6.25 m^{-2}). In microsites, number of herbage species was highest down slope and lowest at midslope position. Dry matter production increased downward being highest at down slope position (567.8 g m^{-2}).

Dry matter production was 478.5g m^{-2} in 10-20% to 439.2 g m^{-2} in <10% slope. Among the treatment, dry matter production was 523.6 g m^{-2} in contour trench plots as compared to

413.5 g m^{-2} in control plots. It was significantly greater (458.8 g m^{-2}) in treated area than untreated (244.9 gm^{-2}) area of the site.

Project 2: Studies on carbon sequestration in different forest types of Rajasthan. (AFRI-88/EED/ 2008-11)

Status: Project was started after approval from the RPC in April 2008. The objectives of the project were (i) to estimate carbon stock in forest soils, (ii) to estimate carbon stock in forest litters, and (iii) to estimate carbon stock in aboveground and below ground biomass; with broader objective to provide an estimate of carbon stock of forests in Rajasthan for its utilization in planning and execution of afforestation/ reforestation programme in this region.

Dry teak forest at Jhaunda, Pratapgarh

Butea forest in Dhariyavad, Pratapgarh

Boswellia forest, Arampura, Pratapgarh

Madhuca forest, Siyakhedi, Pratapgarh

Dry bamboo brake, Umarkot, Pratapgarh

Aegle forest, Samlipathar, Chittorgarh

In the Inproject vegetation in different forest blocks of Banswara, Chittorgarh, Dungarpur, and Pratapgarh Forest Division were surveyed for estimation of carbon stock in vegetation, forest

litter and soil samples up to 90 cm soil depth. Tree and shrubs growth measured and herbage biomass recorded. Litter, plant and soil samples collected from 80 sites. A carbon, nitrogen and sulphur (CNS) analyzer and associated chemical purchased for carbon estimation. *Phoenix savannah* and *Madhuca indica* based forests have been identified as the additional types of forest reported in Rajasthan.

Studies at five different forest blocks of Pratapgarh with *Dendrocalamus strictus* as one species showed a total number of 35 trees/shrub species. In this population of trees/shrubs varied from 770 at Arampura to 3280 plants per ha at Jhaunda. Numbers of species were highest in Arampura, whereas, it was lowest in Janagarh forest blocks. Most common species in these sites were *Tectona grandis* and *Dyospyros melanoxylan*. In these blocks, *T. grandis* showed highest abundance, frequency and density. Observations on growth and productivity of *D. strictus* showed highest productivity with greater availability of soil resources and species diversity.

Studies in *Euphorbia* scrubs type of forest of Jodhpur indicated highest number of vegetation diversity i.e. 13 in north-east aspect, whereas, it was 12 in south-west aspect. Total population of trees and shrubs were 323 and 101 number in 1 ha area in respective aspect.

Anogeisus pendula forest, Chittorgarh

Phoenix savanna, Karaundia, Chittorgarh

Technology Developed

Technology developed for reclamation/rehabilitation of waterlogged soil in canal command area of IGNP using principle of bio-drainage. The technology is raised bund with sand mulching and plantation with species of high transpiration potential. Intervention like protection of the area, soil working and planting of tree species enhanced natural regeneration of tree, shrub and bushes also that transformed a waterlogged (stagnant water of 20 cm to 1 m) area into productive land. Water logging has receded up to 1.25 cm soil depth within a period of four year.

Project 3: Effect of fertilizer application on growth and yield of ten year old *Salvadora persica* and *Acacia ampliceps* plantation on arid salt affected soil. (AFRI-89/NWFPD/ 2008-11)

Status: Initial growth data and, seed yield recorded for *A.ampliceps*. Un-favorable weather conditions (high temprature, strong winds and untimely rain) almost destroyed the fruit/seed seed yield in *S. persica.* For *S. persica,* the treatmentwise initial mean height and crown diameter was ranging from 163-194 cm and 173- 203 cm respectively. For *A. ampliceps,* these values were 172-238 cm and 137-223 cm. Rooted slips of Karnal grass were obtained from RRS, (CSSRI, Karnal) Lucknow and Grass slips of Karnal grass and *Sporobolus diander* planted in field with *A. ampliceps*.

Initial soil pH, EC and % SOC was determined. % SOC data ranged from 0.10 -0.15, 0.09 - 0.12 and 0.02 - 0.12% in 0-25 cm, 25-50 and 50-75 cm soil layer inside the plant pit. While it was 0.18 - 0.34, 0.14 - 0.20, 0.18 - 0.25 % in inter row spaces in *S. persica.* % SOC ranged from 0.25-0.42, 0.34 -0.46 and 0.24 – 0.33 in 0-25 cm, 25-50 and 50-75 cm soil layer inside the plant pit and it was 0.24 - 0.36, 0.29 - 0.30, 0.19 - 0.30 percent in inter row spaces in *A. ampliceps.* Soil samples for *A. ampliceps* and *S. persica* plants were analysed for micronutrient status.

Treatmentwise phenological observations were recorded fortnightly from January 2009. Fruit setting has been initiated in all the treatments in S. *persica*, maximum mean fruit yield/tree (132 g) was obtained in T_7 closely followed by T_8 (urea + K_2SO_4) treatment. In case of *A. ampliceps* trees were healthy, new leaves initiation was observed, however, flowering has been aborted in most plants in the month of March 2009.