

PROJECTS COMPLETED DURING THE YEAR 2008-2009

PLAN PROJECTS

Project 1: Assessment of International Neem Provenance Trial (AFRI-78/FGTB/2006-2009)

Findings: Provenance trials of Neem were established by AFRI as a collaborating institute in International Neem Network with an aim to improve the genetic quality and adaptability of Neem and to improve its utilization. The materials for the present investigation come from one of these Provenance trials located at Jaipur. This trial was initially established with 18 provenances including 8 international and 10 Indian provenances in the year 1996. At the time of initiation of the project, only 12 provenances were present and the other provenances were succumbed to extreme biotic factors like frost and heat. 3 of the 12 provenances are from Yezin (Myanmar), Geta, Dhangadhai (Nepal) and Chamnion (Tanzania), and the rest of the 9 provenances are from India. The statistical analysis showed no significant difference between the provenances in terms of growth traits i.e. height and diameter at breast height (dbh). Among the international provenances, the provenance from Nepal (Geta, Dhangadhai) showed good growth in height which was above the mean height during the years 2006 and 2008, except in the year 2007. The mean growth of this Nepal provenance (5.37 m) was the best among all other provenances. Other two introduced provenances showed less height growth than the mean. Most of the Indian provenances, which performed better in growth, did not show stability in the assessment years. Only two provenances viz. Kalyani, Mandore and local seed source (Jaipur) maintained consistency in their growth during the assessment years. The Yezin (Myanmar) and Chamnion (Tanzania) provenances and Ramannaguda and Sagar provenances from India continuously performing poor. The Geta (Dhangadhai) provenance from Nepal showed more growth in both height and dbh than the mean. Except the Ramannaguda provenance, all other provenances from India had higher growth in Dbh than the mean.

There is sufficient synchronization in flowering of both the Indian and introduced provenances. The seeds obtained from the provenances showed variation in length and diameter which was ranging from 10.1 mm to 12.5 mm and 6 to 7.5 mm respectively. Among the introduced provenances, the seed size of the Yezin (Myanmar) provenances was almost equal to the size of the Indian provenances. The oil content was ranging from 36.34% to 43.24% in kernel. The variation in oil content amongst the provenances was statistically significant. The provenances from Ramannaguda and local seed source (control) had higher oil content (<43%) and which was followed by the Tanzanian provenance (41.13). The other introduced provenances had oil content on par with other Indian provenances (36% and above).

In the present study, all the introduced provenances had synchronization in flowering and produced seeds. Hence, these provenances can further be best utilized for further improvement programme by introducing more provenances and individual superior trees from tested ecological zone.



Neem tree (Kalyani prov.) in
Peak flowering



Close view of flowering
branch



Tertiary branch with
fruits

Project 2: Relative Resistance of Neem Provenances to Insect Pests and Mites and Their Bio management In Arid Areas. (AFRI-73/FPD/2006-09)

Findings:

Relative resistance of neem provenances to neem weevil, *M. tenuicornis*: An experiment has been conducted to study the resistance of 39 neem provenances to neem weevil, *Myloccerus tenuicornis*. The provenance from Palanpur and Jhansi exhibited the least preference for the larvae (0.65 and 0.69 cm sq.), whereas the provenance from Mulag was found to be the most favoured or susceptible host as the leaf area consumed by larvae was 3.11 sq cm.

Microbial control agent of neem weevil: Infection of an entomopathogenic fungus, *Beauveria bassiana* has been observed in the adult population of neem weevil, *M. Tenuicornis*. Efficacy of this entomopathogenic fungus has been studied.

Bioecology of neem defoliator: A complete life cycle under different generations took an average period of 39.75 days which ranges from 29 to 47 days under different conditions of temperature and relative humidity. The population dynamics of *Myloccerus tenuicornis* on 39 neem provenances is in progress. Periodical data are being collected and being analyzed. Seasonal variation of economically important insect pests i.e. sap suckers and defoliators has been studied. The mortality data on pest incidence have been recorded.

Project 3: Developing strategies and methodologies for extension of forestry research technologies in semi-arid and arid areas. (AFRI-71/AFE/2005-09).

Findings: Dissemination of research information was ensured by participation in farmers fair held at CAZRI, Jodhpur on 12th September, 2008 and Hast Shilp Utsav held from 2nd to 11th January 2009 at Rawan Ka Chabutra, Jodhpur. Designed the material and got 80 bilingual (Hindi-English) research display material prepared for the VVK AFRI, Bichhwal, Bikaner, Rajasthan and the Interpretation Centre, AFRI. Similarly 16 research bilingual display boards were prepared in English & Gujarati for the VVK site at Rajkot, Gujarat. Strengthened Library and Information System resource data base by addition of books related to agroforestry &

Extension. Prepared report on the Bamboo training programme under NMB and forestry training held for field functionaries of State Forest Department and farmers of Gujarat held at Rajpipla and Rajkot, Gujarat respectively.

Project 4: Screening of Exotic and indigenous plant species for their performance potential on arid salt affected soils with different level of management. (AFRI-49/NWFP/1997-09).

Findings: A total of eight experimental trials were laid out on lithic, calcid, coarse sandy to loamy sand salt affected area of Gangani in Jodhpur district in different years (from 1997 to 2003). An experimental trial was laid in August 2003 with two fodder species namely *Zizyphus mauritiana* (ber) and *Colophospermum mopane*. The trial was laid with two levels of gypsum (0 and 100% soil G.R.) and three doses of nitrogen (0, 9 and 18 g of N in the form of urea) on two modes of planting (control and circular dished mound). *C. mopane* registered 92.0 % survival on CDM and 86.5 % in control after five year of planting. There was no change in survival for mopane for 36 - 60 months period while Ber (*Z. mauritiana*) recorded 17 to 48 % survival on thus failing to survive the experimental conditions. Two Factor Analysis showed that there is no effect of planting technique on survival and growth. However, in case of above ground biomass, CDM was significantly superior to control. Application of Gypsum with 9g N recorded higher biomass compared to all other treatments. Root biomass by excavation showed that root penetrated the kankar pan up to the depth of more than one meter.

Other Major findings

- Exotic shrubs of genus *Atriplex* perform well on arid saline alkali lands with FYM, and nitrogen. They produce nitrogen rich fodder used for sheep and goat. High salt content necessitate mixing with cereal residue.
- *Salvadora persica*, was the best performed indigenous tree with highest survival. It is a slow growing species, application of gypsum and nitrogen gave increase in growth and biomass production.
- *Acacia ampliceps* (exotic) tree perform very well on alkali soils with good soil depth (60 cm to 75 cm minimum) and respond well to FYM, gypsum and phosphorus application. It is a very good fodder for all the animals.
- Large pit size is necessary to mix amendments to create less salty environment during seedling establishment. Double ridged and Circular dish mounds enhanced survival of all the plant spp. by providing protection from water-logging and less salty environment. Crescent shaped drainage trenches served dual purpose- helped in leaching of salts and harvested water.

- Plantation activities helped in improving the site conditions, promoting growth of natural flora (glycophytes as well as halophytes) and natural germination of *S. persica* is also observed.

Distribution of seeds collected from experimental site: One kg seed *C.mopane* and half kg seed of *Acacia ampliceps* were given to Gujarat SFD during 2008.

Project 5: Quantitative estimation of biologically active secondary metabolites in some of the arid zone medicinal plants to ascertain correct harvesting time (AFRI-50/NWFP/2002-09)

Findings: Variation of secondary metabolites in *Tribulus rajasthanensis*, *Pluchea lanceolata* and *Cassia angustifolia* in different developmental stages was studied for determining the optimum harvesting time in these species. Analysis of total saponin content in the aerial parts of *Tribulus rajasthanensis* showed that the saponin content high in the vegetative stage (5.45 %) , decreases in the flowering stage (4.1%) and, then, rises again (5.40 %). Total saponin content in fruits was found to be much less (1.5%) as compared to that present in aerial parts. The secondary metabolite (Plucheoside) content in leaves of *Pluchea lanceolata* was found to be maximum in the flowering stage (7.3%). It was found to increase from vegetative stage to the flowering stage and, then, decrease again. The sennoside content in leaves of *Cassia angustifolia* was found to be maximum in flowering stage (1.98%).