

## ECOLOGICAL AND BIOCHEMICAL STUDIES ON SAND DUNE LEGUMES OF WEST COAST OF INDIA

**Abstract of Ph.D. thesis to be submitted by Bhagya, B. (Research Scholar, Department of Biosciences) to the Faculty of Science, Mangalore University, Mangalagangothri, Karnataka, India**

Coastal sand dunes (CSD) are specific biomes, which interact with beaches seawards and with terrestrial communities landwards. Richness and diversity of legumes and arbuscular mycorrhizal (AM) fungi of sand dunes of nine locations of the south west coast of India was studied. A total of 20 legumes constitute the strand vegetation. Among them *Canavalia maritima*, *Derris triflorum* and *Mimosa pudica* were dominant. Organic carbon is mainly responsible for distribution of legumes and AM fungi on the dunes. The AM spore density may be one of the reliable indices and can be used to understand the magnitude of anthropogenic disturbances on CSDs. An ethnobiological survey was conducted at 12 selected locations encompassing Goa, Karnataka and Kerala along the CSDs of south west coast of India to document the traditional knowledge and utility of CSD legumes. Various traditional, ethnomedicinal practices and biological activities of different legumes have been documented and reported. Two mat-forming creepers (wild legumes) *Canavalia maritima* and *C. cathartica* which are dominant and widely distributed on the dunes, occasionally consumed by fisher folk was selected for nutritional and biochemical studies. Raw and pressure cooked tender pods and ripened beans of *C. maritima* were analyzed for nutritional and antinutritional properties. The protein quality was evaluated through *in vivo* growth and nitrogen balance experiments on feeding albino rats. Similar studies were conducted with raw and pressure cooked tender pods and ripened beans of *C. cathartica* from CSDs and was compared with that of mangrove *C. cathartica*. Due to lack of material *in vitro* starch and protein digestibility was evaluated. The results of the ripened beans are compared with dry seeds. Ripened beans of *Canavalia* spp. consists of high crude protein, carbohydrate, fiber, energy and potassium. Potassium, magnesium, zinc and manganese of raw and cooked beans meet NRC/NAS (1989) pattern for infants. The EAA (e.g. threonine, valine, isoleucine, leucine, tyrosine/phenylalanine, lysine) in raw and cooked ripened beans fulfill the FAO/WHO/UNU (1985) pattern of requirement for adults. The raw and cooked beans were devoid of orthodihydric phenols and trypsin inhibition activity with negligible tannins. Growth studies *in vivo*, protein and starch digestibility *in vitro* revealed improved qualities on cooked beans. The crude protein in tender pods was higher or comparable to seeds of some wild legumes and edible legumes. Fiber in raw tender pods significantly decreased on cooking, while crude carbohydrates and energy were significantly elevated. Cooking tender pods did not drain minerals too much and potassium was most abundant. Potassium, magnesium and zinc surpassed or are comparable with NRC/NAS (1989) standards for infants. The EAA (threonine, valine, isoleucine, phenylalanine and lysine) meet the FAO/WHO/UNU (1985) requirement. Total phenolics were low and decreased on cooking, while tender pods were devoid of trypsin inhibition activity with negligible tannins. Strong hemagglutination activity of raw tender pods was partially decreased on cooking. Pressure-cooking of ripened beans and tender pods elevated all parameters of growth and showed positive nitrogen balance in rats and hemagglutination activity of lectin was partially knocked off, but needs alternative thermal strategies to eliminate completely to serve as food for human or livestock.

**Key words:** Coastal sand dunes, Wild legumes, Arbuscular mycorrhizae, *Canavalia*, Beans and tender pods, Thermal treatment, Nutritional and antinutritional factors, Protein and starch digestibility