POPULATION ECOLOGY OF SOME MEDICINAL PLANTS OF MALAM JABBA,SWAT-PAKISTAN

ABSTRACT

A study on the population ecology of three commercially important species viz: *Persicaria amplexicaule*. D. Don. *Valeriana, jatamansi* Jones. and *Viola serpens* Wall ex Roxb was conducted in various ecologically and economically important sites of Malam Jabba, Swat, Pakistan from 2002 to 2004. The altitude of these sites ranged from 1200m to 3200m. The objectives of the present study were to: (1) identify the ecological range, abundance/distribution and phenological stages of each targeted species, (2) determine the effect of current management practices and altitude on their population status and size, (3) evaluate the suitability of single census of population stage structures as a tool for quick assessment of the viability of each plant populations (4) provide advice for optimal habitat management and moreover, (5) to determine their suitability under *ex-situ* condition and also to assess the economic feasibility of growing medicinal plants in the study area.

The floristic composition and structure of the study area showed 200 species belonging to 75 families. Asteraceae, Lamiaceae and Poaceae were important families in the study area. The biological spectrum showed that therophytic and hemicrytophytic life form and micro-nonophyllous leaf sizes were dominant in the area. The area is rich in traditional usage of various plants. They include, medicinal (80 spp), fodder (25 spp), timber (9 spp), fuel wood (20 spp), multipurpose (30 spp) and other varied uses.

A market survey revealed that the structure of medicinal plant trade is complex and heterogenous, involving many players. The collectors are often not aware of the high market prices and medicinal values, and most of the collected material is sold to local middlemen at a very low price. There was an increase of 3 to 5 folds in prices from collectors to the national market.

The overall density, herbage coverage and fresh/dry biomass of targeted plants were determined in each site, twice in a year, i.e. before and after the collection period. The overall population density of each targeted plant showed significant decrease after the collection period. All the investigated parameters generally showed an increase of 2 to 4 times in protected sites as compared to the unprotected areas. The growth performance of the tested species also increased with rise in elevation. The abundance/distribution and overall population of each targeted plant was generally high in North facing slopes as compared to South facing aspects. The air and soil temperatures were slightly higher in open areas than in the protected site and showed decrease with increasing elevation. Both the air and soil temperatures were relatively higher in South slopes than on the North East slopes.

The vegetation analysis of the area indicated eleven plant communities around the targeted plants. The present vegetation is the relics of moist temperate coniferous forest in the area.

The communities reflect highly deteriorated conditions. By using cluster analysis three different types of populations viz: dynamic, normal and regressive were distinguished in the population of target plants. The three population types differed with respect to population size and total plant density, which were maximum in dynamic, intermediate in normal and lowest in regressive populations.

Both the structure and composition of the surrounding vegetation were associated with the types of populations found. The dynamic and normal populations occurred in species rich vegetation, comprising of species of nutrient poor soil. While the regressive population occurred more often in species poor vegetation, comprising mainly species of nutrient rich conditions.

The *ex-situ* study of six medicinal species (*Bergenia ciliata, Valeriana jatamansi, Dioscorea deltoidea, Paeonia emodi, Persicaria amplexicaule* and *Viola serpens*) in four locations – revealed a highest mean survival of 80.7% across all locations for *Viola serpens* followed by 58.7 % for *Valeriana jatamansi*. The remaining four species exhibited very poor survival. *Viola serpens* revealed a decrease in sprouting percentage with increase in altitude while all other species indicated an increased trend in sprouting with increase in altitude. There was also a general increase in rhizomes and flower yield with increasing altitude for *Valeriana jatamansi* and *Viola serpens* respectively. Cultivation of only two species, *Valeriana jatamansi* and *Viola serpens*, under farmland conditions at Upper Swat appeared successful and economically viable.

The study concluded that the conservation of the remaining populations of targeted plants will be best achieved by proper time of sustainable harvesting. It is only possible with the participation of local communities.