Pak. J. Bot., 40(3): 967-971, 2008.

SIGNIFICANCE OF FLORA WITH SPECIAL REFERENCE TO PAKISTAN

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Introduction

The principal object of a Flora is to afford the means of determining any plant growing in the area circumscribed. This is usually achieved by a combination of keys and descriptions. As the information available about plants of different parts of the world is extremely variable, hence a vast range of floras are available ranging from concise or Field Floras to Research Floras. A reasonably good Flora is expected to provide a work, which can be used for proper identification of all our plant-wealth so that its utilization could be taken up on a scientific and systematic basis. As stated by van Steenis (1957) the correct identification of every plant is of utmost importance, for a plant's name is the key to its literature – in other words, the key to what we know about it. Generally people do not realize how important it is to know the plant wealth that God has given us, particularly in a country where we do not even have a Department of Botanical Survey.

Unfortunately, at the time of the creation of Pakistan in 1947, there was not a single comprehensive book available, which could deal with all the plants of the country. The only account available was J. D. Hooker's "Flora of British India" (1872-1897), which was about 75 years old at that time. Moreover, it did not include entire Pakistan. Some of the important areas like Balochistan and most of the North West Frontier Province were not included in this account. However, a number of lists and regional floras dealing with some limited areas were available. However, some regional floras and lists of plants of various regions were available. Reference may be made to Ali (1978) for these publications.

The plant collection in our region was started as early as 1820-1822 by W. Moorcroft who had collected in Ladakh and Kashmir, followed by V. Jacquemont in 1828-1832 in Punjab and Kashmir. J. F. Royle (1832-1834) also collected in Kashmir. N. Vicary was the first to collect in Sind in 1838; he also collected in Salt Range, Punjab and the Frontier region. William Griffith (1847) was the first collector in Baluchistan and Khyber Pass area in 1838. It is beyond the scope of the present paper to give an account of the history of plant exploration, for which references may be made to History and Exploration of Plants in Pakistan and Adjoining Areas by R. R. Stewart (1982). One must pay rich tributes to R. R. Stewart (1890-1993) who had collected plants from all over Pakistan.

During the recent past, some outside groups viz., K.H. Rechinger, J.D.A. Stainton, S. Kitamura, J. Lammond and S.A. Bowes Lyon have been active in our country. Some local botanists such as Sultan Ahmed, E. Nasir, N.A. Qizilbash, A.H. Khan and Jan Muhammad are among the first to have collected the plants. Later, a number of enthusiastic botanists joined the band, such as Amin Siddiqui, S.M. H. Jafri, A. R. Beg, S.M.A. Kazmi, S.I. Ali, Y. Nasir, M. Qaiser, S. Qureshi, K. Aziz, Sultanul Abedin, A. Ghafoor, A. Hussain, S. Omer, K.A. Malik, S. Nazimuddin, Z. Ali, T. Ali, R. Rafiq, M.

Shah and others (Ali, Omer & Qaiser, 2001). There are a number of areas, which are yet to be explored thoroughly, such as between Khyber Pass and Kurram Valley, mountain areas between Khyber Pass to Dir, Koh-i-Suleman Range between Zhob and D. I. Khan, Kirther Mountain range and Pabbi hills between Sindh and Balochistan, North and South Waziristans, Deosai Plain, Hunza, Baltistan, Chitral etc. New plants may turn up from other regions as well.

From 1947 to early 1960, 3-4 herbaria were present in the country with few thousand specimens, with the exception of the herbarium of Gordon College, Rawalpindi, due to Stewart who had collected extensively even before the creation of Pakistan. He continued collecting plants for about 50 years, till 1960, and left a rich heritage of about 60,000 specimens at Gordon College Herbarium, Rawalpindi. During the last 25 years some new herbaria have also been established. Presently 9 herbaria are present in Pakistan with only about 530,000 herbarium specimens (Holmgren, K., Holmgren, N. H. & Barnet, 1990).

Since most of the pioneer workers were British and few from other European countries therefore our historical and important collections were deposited in various European herbaria: Kew, British Museum (Natural History), London and Edinburgh or in India: Calcutta, Dehra Dun or Bombay, except some odd duplicates present either in Rawalpindi (RAW) or in the herbarium of the Punjab University, Lahore. Therefore writing a Flora of Pakistan by a Pakistan based team was an uphill task due to lack of herbarium and library facilities. The work was only possible due to the publication of the monumental work, "*An Annotated Catalogue of the Vascular Plants of Pakistan and Kashmir*" by R. R. Stewart (1972).

It is pertinent to add here that the Floras of our neighbouring countries are being written by foreign teams such as *Flora Iranica* by K. H. Rechinger (Austria), *Flora of Afghanistan* by S. Kitamura (Japan), *Flora of Ceylon* (Sri Lanka) by Smithsonian group, *Flora of Iraq* by Guest & Townsend (U.K.), *Flora of Bhutan* by D. Long & H.J. Noltie (Edinburgh). It is encouraging to note that a revised approach has now been adopted for the production of 32 volumes Flora of India. Six volumes (vols. 1-3, 5 and vols. 12-13) have already been published (1993-2000). Hopefully, others are in the pipeline.

Flora of [West] Pakistan project: Proposals for writing a Flora of West Pakistan were submitted in 1966-67 through the Agricultural Research Council, Government of Pakistan to the United States Department of Agriculture, under PL-480. The earlier 131 fascicles were published under the title of "Flora of West Pakistan". However, after the separation of East Pakistan as Bangladesh, the title of the Flora has been changed to "Flora of Pakistan". These projects were separately awarded to Gordon College, Rawalpindi and Department of Botany, University of Karachi under the supervision of Late Prof E. Nasir and Prof. Dr. S. I. Ali respectively with an understanding that the two groups work in close collaboration with each other. E. Nasir & S. I. Ali jointly edited the accounts of 190 families for Flora of Pakistan from 1970 to 1989. In 1989, Prof. Nasir migrated to Canada at the age of 81. His son Y. J. Nasir along with S. I. Ali edited the accounts of 3 families (No. 191-193). Y. J. Nasir in 1992 also followed the footsteps of his father and settled in Canada. S. I. Ali and M. Qaiser are now editing the Flora of Pakistan (1993 onwards).

The editors have frequently visited European herbaria in the course of editing the manuscripts. In addition, draft copies of the manuscripts were sent to various experts all over the world for vetting. Many authorities and friends have responded to our requests

and pointed out short-comings and offered suggestions for improvements. It is a matter of pleasure to express our gratitude to all of them. To date 47 botanists have contributed to Flora of Pakistan including 16 contributors from abroad. Likewise 14 artists have contributed the illustrations.

The first fascicle of Flora of Pakistan was published in 1970. Todate the accounts of 215 families have been published involving 1389 genera and 4758 species spread over 6815 printed pages and accompanied by 1277 plates depicting 2879 illustrated taxa. Accounts of 5 families, involving c. 183 genera and c. 763 species are yet to be published. During the course of these investigations 125 new taxa were described, consisting of 6 new genera, 78 new species, 21 new subspecies and 22 new varieties.

Endemism: Endemic plants are restricted to a particular region and not found anywhere else in the world. These endemic plants have a special significance and give unique individuality to a region. Pakistan is also reasonably rich in endemic plants though the flora of Pakistan does not include a single endemic family but todate 5 monotypic genera (*Douepia, Sulaimania, Kurramiana, Wendelboa* and *Spiroseris*) and c. 400 species (7.8%)) belonging to c. 169 genera and 45 families are endemic in Pakistan. About 80% of endemic flowering plants are confined to the northern and western mountains of Pakistan and Kashmir. Families with more than 20 recorded endemics are Leguminoseae (57), Asteraceae (50), Apiaceae (34), Poaceae (32) and Brassicaceae (21). The genus *Astragalus* contains 37, the largest number of endemics (Ali, 1978; Ali & Qaiser, 1986).

Only recently some critical studies have been conducted on 9 endemic flowering plants of Gilgit and Baltistan. According to IUCN Red List Categories and Criteria (Anon., 2001) *Astragalus clarkeanus, Asperula oppositifolia* subsp. *baltistanica, Berberis pseudoumbellata* subsp. *gilgitica, Haplophyllum gilesii* and *Tenacetum baltistanicum* are found critically endangered (CR), *Aconitum violaceum* var. *weileri* and *Rhodiola saxifragoides* are vulnerable (VU). We do not have enough critical data about other endemic taxa. Hence it is obvious that remedial measures must be adopted for each taxon according to their nature of threats in order to protect them from extinction (Jan Alam & Ali, unpublished).

Economic importance: Pakistan is quite rich in economically important plants. These include plants that are important for food, fodder, medicine, timber etc., from the point of view of the germplasm resources of the cultivated plants of Pakistan, due attention should be given to the fact that northern Pakistan is an integral part of the Central Asian Centre of Diversity (Vavilov, 1950). The ancient trade route from China to Western Asia passed through this region resulting in the introduction of many crop and fruit species, which have been cultivated for thousands of years. Thus the location of Pakistan in the proximity of major centres of diversity has also been a source of genetic enrichment of this area. Further, as the history of Pakistan goes back to the Stone Age, followed by Indus valley civilization (2600 B.C.-1700 B.C.) with well-developed agriculture, which further supports rich biological heritage. The introduction of advanced cultivars (Mexi Pak wheat, IRRI rice etc.), the primitive cultivars that had evolved in response to the earlier prevailing environmental conditions and methods of cultivation are gradually disappearing. There is reason to believe that a number of such resistant genes get accumulated in these primitive cultivars which could provide protection against drought, diseases, extreme heat or cold etc. Wild plants, particularly those, which are related to

cultivated plants, are also very important, for all cultivated plants have arisen from wild plants. Wild relatives of cultivated plants are hardy, capable of surviving under stress conditions and generally disease resistant. Hence these plants are extremely important from the point of view of overall germ plasm resources. Likewise those wild plants, which are directly utilized for various purposes, deserve our attention. Even those plants, which apparently are not economically important, may be of considerable ecological significance as soil binders etc. or hitherto some unexplored plant(s) may even prove to be of considerable medicinal value.

Suggestions for the next phase: As stated earlier, many critical areas, particularly mountain valleys require continuous efforts so far as plant exploration is concerned, so that more new taxa could be discovered. This will also lead to better understanding of the variation pattern facilitating evaluation of delimited taxa. Since the publication of the first issue of Flora of Pakistan in 1970 (Nasir & Ali 1970), about 38 years ago, a number of new taxa have been described and the fresh plant material is also available for study, hence evaluation of available resources is called for. The natural flora continues to change with time due to immigration of species, extinctions and evolution, more so with the current rapidly changing environmental conditions. It is therefore obvious that Flora of Pakistan will have to be revised and enlarged.

Consequent to the wide scale conversion of the natural ecosystems to agriculture, extensive unplanned urbanization and expansion of roads and highways, deforestation etc., inspite of the existence of 10 national parks, 82 sanctuaries, 83 game reserves the natural vegetation is being lost at a very high rate. Unfortunately we do not have any publication on Red List Categories of Pakistan as per recommendation of IUCN. This matter should be given top priority.

In view of the Global Warming, Pakistan is going to face very difficult situation in not very distant future. Some of our coastal low lying areas are likely to be submerged. The glaciers in our mountains are already melting. If this trend continues, they may disappear by 2050 resulting in lesser amount of water in our rivers. The effect of concurrent higher temperatures is likely to lead to desertification. This may lead to very different environmental regimes resulting in the disappearance to many of our plants and the synthesis (through mutation, hybridization and selection) of many new types of plants. Hence it seems desirable to strengthen and reorganize the institutions concerned with the study of our plant wealth.

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(Received for publication 2 January 2008)