



Quarterly

# Newsletter

Pakistan Forest Institute, Peshawar



Chief Patron: Syed Said Badshah Bukhari  
Director General

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Chief Instructor Military College of Engineering addressing the participants

## FOREST EDUCATION NEWS

**HAKIM SHAH**  
Director, Forest Education

The Forest Education Division carried out various activities such as Field Engineering course conducted by Military College of Engineering (MCE) Risalpur, orientation tour of new M.Sc and B.Sc forestry courses session 2011-13 and forestry examinations during October-December 2011. The details are as under:

### Field Engineering Course conducted by Military College of Engineering, Risalpur

Field Engineering course is an important and integral part of M.Sc and B.Sc Forestry courses. Every year the MCE conducts this course for forestry students at its premises. This year, the MCE made alternate arrangements for running it at PFI from September 27 to October 11, 2011. The main modules of the course were Demolition, Bridge/Road

construction, Field Works/Water Supply, Map Reading/Global Positioning System, Disaster Management, Communication and Survival skills.

The closing ceremony of the training course was held at PFI, where Brigadier Fiaz Hussain Shah, Chief Instructor, Combat Wing, MCE was the Chief Guest. The Chief Guest, Director General, PFI and Director Forest Education Division delivered speeches on the occasion.

The Director Forest Education Division welcomed the distinguished guest from MCE and highlighted the course outline and its benefits for the forestry professionals. He acknowledged the worth and importance of the training for the forestry professionals and appreciated the efforts and assistance of MCE in the conduct of the course. Director General, PFI presented the PFI souvenir to the Chief Instructor MCE. The Chief Instructor MCE visited various Divisions of PFI and inquired about their functions. Group photo

session with M.Sc and B.Sc forestry students was held at the end.

### Examinations

The 3rd term annual examinations of M.Sc and B.Sc Forestry courses session 2009-11 were held from 11th October to 1st November 2011 and 12th October to 31st October 2011, respectively.

### Orientation tour of M.Sc & B.Sc Forestry (2011-13) session

On 26.12.2011, the students along with two faculty members left Peshawar for PFI Field Station, Shinkari, Distt. Mansehra. Students were briefed at different places by Mr. Asif Jah, APOF and Mr. Ahmad Zameer, LIF about agro-forestry and silviculture of different tree species found on the way. In the evening, they were given a detailed lecture about the field station.

On 27.12.2011, the students visited flumes, nursery and meteorological station at the field station and then started journey

to Islamabad via Galies Forest Division. On the way, they were shown different coniferous species and their silvicultural characteristics.



Lecture by Mr. Auliya Khan,  
Director CDA

On 28.12.2011, the students were taken to Margalla Hills. Mr. Auliya Khan, Director CDA delivered a detailed lecture about Margalla Forest and its Management. Mr. A. Manan, Deputy Director Forest, CDA accompanied the students and conducted a walk from Manal up to Islamabad on track No.5. The students were briefed about flora and fauna of Margalla Hills.

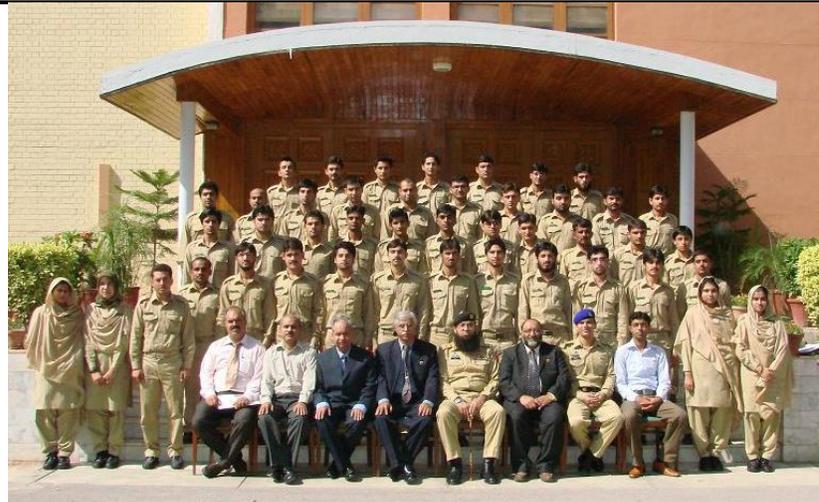
On 29.12.2011, the students left Islamabad for Sialkot. On the way stopping at Kharian Mr. Irshad Ullah, SDFO gave a lecture about scrub forests of Pabbi Hills and students were shown Toba and different grass species in the field.

On 30.12.2011, the students visited Malik Sports Industries, Sialkot, where they were briefed and shown the process of manufacturing of Cricket Bats and Hockey Sticks from wood. Later, the students were taken to the line of control in Sialkot Forest Division. The students were told about felling areas and demonstrated for use of different felling implements, direction felling and bucking by Mr. Asim, SDFO, Sialkot Forest Division.



How to maintain register at sale depot  
Changa Manga Irrigated Plantation?  
Lecture by Malik Saleem, DFO

On 31.12.2011, the students visited Changa Manga Irrigated Plantation where they were given a comprehensive lecture by Malik Saleem, DFO Changa Manga. They were told about management of Changa Manga Irrigated Plantation and then conducted a complete visit of the plantation by Tram under the supervision of Mr. Azam Gill, SDFO Changa Manga. In the afternoon, they visited Jallo Park,



Group photo of the Chief Guest with forestry graduates

where they were briefed about the Park and its management by the Incharge Jallo Park.

On 01.01.2012, the students left Lahore for Peshawar. On the way, they were briefed about plantation and various Range Management activities by SDFO Kharian.

**WATERSHED MANAGEMENT  
RESEARCH EXPERIMENTS AT FIELD  
STATION SHINKIARI IN  
COLLABORATION WITH URFS-  
PROJECT**

**Tariq Mahmood, WMS &  
Zulfiqar Ali, RO**

**Installation**

The watershed management specialist visited the Field Station Shinkiarri from 27/01/2011 to 30/01/2011 for laying out of two research experiments titled "Soil conservation for education, training and development of natural resources at Field Station Shinkiarri" and "Comparative Runoff Plot Study for sediment and water yield at Field Station, Shinkiarri" in collaboration with URFS-Project. For soil conservation study the construction of flumes was completed. The staff was directed to complete the fencing and check damming immediately so that the planting can be done in time to start the data collection by the end of February, 2011. The layout of Runoff Plot study was completed and the drums were calibrated for estimation of water and sediment yield. The staff was directed to immediately start the data collection. Recording and compilation of meteorological data for December 2010 & January 2011 was also checked. All the activities were photographed. Steven Stage Recorders for flumes were checked in the field. Discussed various aspects of data collection, compilation and analysis by Stevens Stage Recorder with Mr. Jehangeer Khan (the Ex- Hydrologist for PARDYP Project).



WMS checking Runoff Plot # 3



Newly constructed flume # 1



Stevens Stage Recorder

**DENDROREMEDIATION – AN  
ENVIRONMENT CLEAN UP APPROACH  
WITH TREES**

**Tanvir Hussain, AWT**

Dendroremediation is an emerging technique for clean up of toxic chemicals from environment with the help of trees. The ability of certain selected trees to effectively remove large amounts of toxics, especially heavy metals from soils and waters can provide innovative, economically efficient and environment

friendly approaches to reduce these toxics. Various herbaceous plants have been used to take up pollutants and allow more orderly disposal procedures at possibly lower costs but limitations are associated with the characteristics of these plants. Trees, with their large biomass and deeper and more integrated root systems provide a unique means for deep cleansing of soil and aquifers. The use of trees as bioremediation agents is in its infancy, but gaining interest and acceptance throughout the world. The technology is truly *in situ*, as it does not require movement of soils, or water, and is much less energy demanding; it can be applied on different scales, from small plots to large sites. It has a high potential for improvement by novel techniques that require much lower capital and labor costs as compared to engineering approaches. Keeping in view the above context, following reported trees species are very effective for the remediation of heavy metal contamination in water and soil.

Name of trees	Contaminants	References
<i>Tamarix aphylla</i>	Fe, Mn, Zn, Ni, Cu	Wafa'a, 2009
<i>Populus euramericana</i>	Cu, Cd, Zn	Borghi <i>et al.</i> , 2007
<i>Eucalyptus tereticornis</i>	Fe, Zn, Cu	Evvie C. and S. Subramanian, 2009
<i>E. camaldulensis</i>	Mn	Reichman, 2004
<i>Dalbergia sissoo</i>	Mn, Fe, Cu, Zn, Pb	Genda S. and M. Bhati, 2003
<i>Azadirachta indica</i>	Cr	Sakthiveland, V. and M. Vivekanandan, 2009

**BOTANICAL GARDEN A SOURCE OF BIODIVERSITY CONSERVATION**  
**Muhammad Shabir Mughal**  
**Forest Botanist**

Green plants are known to have existed on the earth for almost 400 million years ago. Since then, plants are providing manifold benefits to the mankind, such as life-giving oxygen through their leaves, food, timber, fiber, medicine etc. for the sustenance of life. Plants also rehabilitate the degraded soils and provide shade and shelter to a variety of wildlife and human beings. Apart from these practical benefits, they also enhanced the quality of human life with their greenness and beauty, making earth picturesque and more habitable.

Pakistan with diverse climatic conditions, broad latitudinal spread and great altitudinal range has remarkable diversity of ecosystem. These range from coastal mangrove forests to spectacular high mountains of Western Himalayas, Hindu Kush and Karakorum ranges. These ecosystems support a wide variety of plants which constitute the over all biological diversity.

Some of the plant and wildlife species are either endangered or at the

verge of extinction, mainly because of habitat loss due to over-exploitation to meet the demand of ever-increasing human and associated population pressure resulted deforestation, soil erosion, salinity, water logging, urbanization and climate change. These have become major threats to the plant diversity of Pakistan. It has been established that extinction or loss of single plant species results in a loss of 203 million dollars and this warrants conservation of endemic plant for prosperity of future generation. A botanical garden is a unique window to the wonders of plant kingdom and helps in controlling environmental pollution, enhancing aesthetic and recreational value of plants and their impact on the life of living organisms.

Keeping in view the importance, a Botanical Garden was established in 1962 at Pakistan Forest Institute, Peshawar. The objectives of botanical gardens are manifold, as extensive collection of plant heritage, which provides research, education and recreational facilities to masses for love of nature in general and in particular as:

- > *Ex-situ* conservation of indigenous and exotic, rare and endangered plant species for research and education
- > Serve as a *Gene* bank to enhance plant diversity for future prosperity
- > *Provide* research and education facilities to forestry students and researchers at door step as ecological laboratory
- > *Creating* awareness and education to general public about the natural heritage, recreation and conservation of Plant Diversity.

**Plant collection**

This botanical garden is spread over an area of 5 acres adjacent to the main building of PFI. The plants were brought from different ecological zones of the country and planted at this garden. This garden is located in warm sub-humid zone with continental type of climate at Peshawar. Winters are very cold and summers are very hot. The garden consists of cacti and mixture of trees, shrubs and climbers of evergreen and deciduous nature. The main collections contain wild species of higher plants of different regions of the country, both indigenous and exotic. The whole area is divided into 16 plots; gymnosperms, monocots and dicots. Representative plant of every group for quick identification and ready reference is labeled. A small hillock was established with planting of rockery plants.

**Plant Conservation**

*Ex-situ* plant conservation is one of the main activities of the botanical garden. Endangered and rare plants species of economic importance both endemic and naturalized were planted to enhance plant diversity conservation. Because of richness in plant species of various forms and characters, this garden is providing excellent opportunities of education, research and recreation.

**FIBER MORPHOLOGY IN RELATION TO SUITABILITY OF A WOOD SPECIES FOR PULP AND PAPER**

**G. M. Nasir,**  
**Logging Officer**

In paper making, fiber is the basic component material on which the paper properties depend. Fiber morphological characteristics play a key role to find out suitability of any wood species for pulp and paper manufacture.

Fiber length generally influences the tearing strength of paper. Greater the fiber length, higher will be the tearing resistance of paper. On the other hand, longer fibers tend to give a more open and less uniform sheet structure.

Fiber wall thickness has an important bearing on most paper properties. Thick-walled fibers give bulky, open sheets with rather rough surfaces. On the other hand, thin-walled fibers give dense and well formed sheets. Thick-walled fibers do not collapse readily when made into a paper sheet, therefore, present less opportunity for fiber bonding. Pulp strength properties such as burst, tensile and particularly folding endurance are adversely affected by an increase in fiber wall thickness.

Fiber diameter along with the fiber wall thickness governs the fiber flexibility. Fiber lumen width affects the beating of pulp. Larger the fiber lumen width better will be the beating of pulp because of the penetration of liquids into empty spaces of the fibers.

Further, arithmetic ratios calculated from the dimensional measurements of fibers also help to assess various properties of paper. The most important and primary observation in order to find suitability of any wood species for pulp and paper manufacturing is the Runkel ratio (2 x cell wall thickness/lumen width). Favorable pulp strength properties are usually obtained when the value of Runkel ratio is below 1. High Runkel ratio fibers are stiffer, less flexible and form bulkier paper of lower-bonded area than the low Runkel ratio fibers.

Strength properties of paper like tensile strength, bursting strength and folding endurance are affected mainly by the way in which the individual fibers are bonded together in paper sheet. The degree of fiber bonding depends largely on the flexibility and compressibility of individual fibers.

Fiber lumen width/diameter ratio (flexibility coefficient) influences the flexibility and compressibility of fibers in paper sheet. Higher the value of this ratio dense and well formed will be the paper sheet.

Fiber length/width ratio (Felting coefficient) also influences the fiber flexibility. Higher the value of this ratio, better the chance of forming well bonded paper.

Fiber wall thickness/diameter ratio (rigidity coefficient) influences the fiber bonding in paper sheet. An increase in the value of this ratio results in decrease in fiber bonding.

In Wood Anatomy Lab. of PFI, a number of locally grown low value wood species have been studied for their fiber morphology in order to assess their suitability for pulp and paper manufacture. On the basis of Runkel ratio, Amaltas, Alstonia, Anjir, Ber, Bakain, Black Siris, Dhak, Frash, Gul-i-Nishtar, Ipil Ipil, Eucalyptus, Jand, Jacaranda, Lasura, Mango, Mesquite, Oroxyllum, Pipal, Phulai, Paper-mulberry, Ritha, Robinia, Semel, Sohanjna, Tun, White Bakain and White Siris wood species may be used as raw material for pulp and paper manufacture.

### IMPORTANCE OF OCIMUM OIL

**Tanvir Ahmad Qureshi**  
Forest Chemist

The oil is usually extracted from the fresh or dried leaves of Ocimum species by steam distillation. The volatile oils distilled from Ocimum are important flavouring agent throughout the world. Although not used in large quantities, oil of ocimum is employed in all kinds of flavours, including those for confectionery, baked goods and condimental products, (chili sauces, tomato pastes, pickles, vinegars ) and in spiced meats, sausages etc. The oil also serves for imparting distinction of flavour in certain dental and oral products. Oil distilled from *Ocimum canum* Sims contains a high percentage of d-camphor and this plant is considered as a new source of natural camphor.

Camphor separated from the Ocimum oil is a natural dextro-organic compound. It exists in the form of colourless long needle-like crystals. The camphor content of the oil increases in fall. An oil distilled during the August harvest contained 47

percent of camphor; and that in October, 74 percent.

The Ocimum spp. grow on a wide range of soils, but thrives best in deep rich, well drained lands. Various types of loamy upland soils are best suited. Volcanic soils seem to favour the development of camphor in the plant.

In Pakistan *Ocimum basilicum* L. (Niazbo) is found wild in Azad Kashmir, Balochistan, Khyber Pakhtunkhwa, Punjab and Sindh at an elevation from 2,000-3,500 m. It is now cultivated as an ornamental plant in KP, Sindh and Punjab



**Ocimum basilicum**

A study was undertaken in Forest Chemistry Branch, Pakistan Forest Institute, Peshawar to find out the yield of oil and camphor contents and to determine the physico-chemical characteristics of oil from *Ocimum basilicum* L. Oil from the dried leaves of *Ocimum basilicum* L. was extracted by steam distillation, followed by the use of petroleum ether as solvent for the complete recovery of oil. Yield of oil obtained was 2.44% which is encouraging enough and compatible to oil yield reported in literature. The physico-chemical properties of the oil revealed that it could be used as flavouring agent in pharmaceuticals, soap, dental cream and cosmetics in place of oil from other species of ocimum.

### DRIG LAKE A RAMSAR SITE OF SINDH PROVINCE

**Mian Muhammad Shafiq**  
Deputy Conservator Wildlife

Drig Lake is located in District Larkana. This is a natural lake, which came in existence in 1880 with the result of High River Indus flood. This lake was the property of Sheikh Noor Muhammad since 1885 up to 1977. It was declared as Game Reserve on 21<sup>st</sup> October 1972 and as Wildlife Sanctuary on 18<sup>th</sup> December 1977.



Identification of Waterfowls

At present the total area of the lake is 403 acres, of which 238 acres of land is the property of Sheikh Family and 165

acres land is revenue land and leased in the name of local people.

### Flora

Typha species is dominant in the vegetation, which has also covered eastern and western part of the lake. The other plant species of the area are: Lye (*Tamarix aphylla*), Puna (*Ehretica serrata*), Lana (*Salsola foetida*) and Khabar (*Cynnodon dactylon*).



View of the lake

### Fauna

The mammal species are: reported in the area: Mongoose (*Herpestes edwardsi*), Jackal (*Canis aureus*), Jungle Cat (*Felis chaus*), Porcupine (*Hystrix indica*), Hedge hog (*Paraechinus micropus*), Wild hare (*Lepus nigricollis*) etc.

Drig Lake has a unique combination of avi-fauna comprising both migratory and resident populations.

The migratory waterfowls recorded in the Lake are: Shoveller (*Anas clyptea*), Common Teal (*Anas crecca*), Coots (*Fulica atra*), Little cormorant (*Phalacrocorax niger*), Little Grebe (*Tachybaptus ruficollis*), Black Headed Gull (*Larus ridibundus*), Gadwall (*Anas strepera*), Moorhen (*Gallinula chloropus*).

Besides waterfowls, other birds which were recorded in the area are: Yellow Wagtail (*Motacilla flava*), White wagtail (*Motacilla alba*), Common sand piper (*Tringa hypoleucos*), Redwattled lapwing (*Vanellus indicus*), Large egret (*Casmerodius albus*), Grey heron (*Ardea cinerea*), Little egret (*Egretta gazetta*), White breasted kingfisher (*Halcyon smymensis*), Pied kingfisher (*Ceryle rudiis*), Marsh harrier (*Circus aeruginosus*), Crow pheasant (*Centropus sinensis*), Common kingfisher (*Alcedo atthis*), White cheeked bulbul (*Pycnonotus leucogenys*), Blue throat (*Luscinia svecica*), House sparrow (*Passer domesticus*), Collard dove (*Streptopelia decaocta*), Indian moorhen (*Gallinula chloropus*), Common swallow (*Hirundo rustica*), Common myna (*Acridotheres tristis*), Bank myna (*Sturnus pagodarum*), Common starling (*Sturnus vulgaris*), Long tailed grass warbler (*Acrocephalus stentoreus*).

The reptilian fauna includes Monitor Lizard (*Varanus bengalensis*), Indian cobra (*Naja naja*), Viper snake (*Vipera russelli*), Rat snake (*Ptyas mucosus*) and Water snakes of Genus *Xenocrophis*.