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The research committee is glad to present first volume in the form of e- issue of **Jbnb** (Journal of B.N.Bandodkar College). Being a single symbolized Science College in the Mumbai University duty of teachers is to produce academic excellence along with social obligations. The common man gets some advantage from the scientific research developing in the region. With this focus in mind we always believed in the collaborative efforts of scientist, teachers and students of the society to inculcate various dimensions of science for the betterment of mankind.

The contribution of the papers from teachers and students is compiled in this volume, covering the multiple tasks across all the regions of the world. We greatly appreciate the efforts of all the authors especially students for their immense contribution which is in special section Students Corner. This activity is to acquaint research, scientific writing and correlate it to the society. The purpose of the e-journal is to provide platform for constructive decisions by students and for developing pathways in their subjects. It aims at creating public awareness and understanding the current status of the research in various fields. So it's a multidisciplinary fitness journal.

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STUDIES ON THE ASSEMBLAGE OF FUNGAL ENDOPHYTES IN LEMON GRASS (*CYMOPOGON CITRATUS* (DC.) STAPF.) FROM THANE, INDIA.

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ABSTRACT

Lemon grass (*Cymbopogon citratus* (DC.) Stapf.), found all over India, is valued for its culinary and therapeutic properties. Endophytes, residing inside tissues of plants without causing overt symptoms, are known for their immense and diversified research potential. In the current investigation, fresh leaves and rhizomes of lemon grass were utilized for isolation of endophytic fungi. One hundred and twenty eight fungal endophytes were recovered from 300 segments of lemon grass collected from 'Jnanadweepa', Vidya Prasarak Mandal's Thane College Campus in Thane city; belonging to ascomycetes (13.5%), coelomycetes (22.7%), hyphomycetes (36.3%) and mycelia sterilia (27.2%). Twenty two different fungal species belonging to 18 genera viz. *Alternaria alternata*, *Alternaria* sp., *Arthrimum phaeospermum*, *Chaetomium bostrychodes*, *C. globosum*, *Colletotrichum dematium*, *C. gloeosporioides*, *Cladosporium cladosporioides*, *Drechslera* sp., *Emericella nidulans*, *Fusarium* sp., *Nigrospora oryzae*, *N. sphaerica*, *Pestalotiopsis* sp., *Phomopsis* sp., *Phyllosticta* sp. and six different sterile forms were isolated. The most frequently encountered fungal endophytes were *Cladosporium cladosporioides*, *Drechslera* sp. and *Colletotrichum gloeosporioides*. The colonization frequency was higher in leaf samples than rhizome samples. Of the three culture media employed, Malt Extract Agar and Potato Dextrose Agar revealed a slightly wider spectrum of endophytic fungi in contrast with Plant Extract Agar, prepared with extract of the host grass supplemented with dextrose.

Key Words: Endophytes, Endophytic fungi, Lemon grass, *Cymbopogon citratus*

INTRODUCTION

The tropical plant genus *Cymbopogon* is represented by about 12 species in India; most of them aromatic and yielding essential oils of commercial value (CSIR, 1950; Sharma and Sharma, 1988). *Cymbopogon citratus* (DC.) Stapf. (Syn. *Andropogon citratus* DC.) (family Poaceae), commonly known as West Indian lemon grass (Hindi: Gandhatrina; Marathi: Gavati chaha, Hirva cha, ole cha; Sanskrit: Bhustrina, English: Lemon grass, melissa grass) is a tall tufted perennial grass with a short rhizome, producing dense fascicles of leaves, with glaucous green linear leaf blades, long- attenuated at the base and tapering upwards to a long setaceous point, up to 90 cm long and 1.6-1.8 cm wide, the margins being rough and midrib whitish on the upper side and stout below; found all over the tropics of both hemispheres. The leaves give an aromatic and pleasant, distinctly lemony aroma on crushing which reflects the english and hindi spoken names, lemon grass and gandhatrina respectively. An infusion of its leaves is taken as a refreshing beverage, as a substitute for tea (Jain, 2006) that has given it the Marathi colloquial name. The grass is today cultivated in many tropical countries inclusive of India for the aromatic oil obtained from its leaves (Munde, 2012). In addition to its commercial importance, the grass is attributed with several medicinal properties viz. it is

considered alexipharmic, an aphrodisiac, anthelmintic, antiperiodic, appetizer, laxative, stimulant sudorific and thermogenic; used in ayurveda for treatment of anorexia, bronchitis, catarrh, headaches, elephantiasis, epileptic fits, fever, flatulence, gastric irritations, helminthiasis, neuralgia, poisonous bites, sprains, vitiated conditions of *kapha* and *vata*, cholera, leprosy and skin diseases (Warrier *et al.*, 1994; Kirtikar and Basu, 2007), the latter three clearly indicating anti microbial properties of this plant. The aromatic oil obtained from its leaves also has similar medicinal uses (Dhiman, 2004). The leaves and oil are used to treat arthritis, distaste, stomach- ache, pyrexia, vomiting and as carminative and nerve stimulant in the Siddha system of medicine (Parrotta, 2001). The grass is also recommended in naso- pharyngeal infections, spasmodic affections of bowels, pulmonary problems, as analgesic, as febrifuge and in several other ailments (Nadkarni, 1976). Pullaiah and Naidu (2003) reported the use of its roots in treatment of diabetes. The aromatic essential oil obtained by steam distillation of leaves and aerial parts, contains citral as major constituent, which is known to vary according to locality, freshness and age of the grass (Chopra *et al.*, 1956, 1969; Huynh *et al.*, 2008), however some reports (Matasyoh, *et al.*, 2011; Mirghani *et al.*, 2012) mention citrenellal, geranial, geraniol, limonene, linalool, myrcene, neral, nerol amongst about 20 different minor and major constituents. The oil, endowed with anti microbial (Sessou, *et al.*, 2012) and several other therapeutic properties (Shah *et al.*, 2011), is also used in culinary flavouring (Shrivastava, 2006), aromatherapy (Pearlstone, 2006), as a mosquito repellent and in agriculture for control of pests (Raghavan, 2011). The oil cake is said to make a good cattle feed (Agarwal, 1986). The ethanolic extracts of the plant exhibit acaricidal (Hanifah *et al.*, 2011), antimicrobial (Joshua *et al.*, 2012), molluscicidal (Otarigho and Morenikeji, 2012) and potential anti-carcinogenic (Suaeyun *et al.*, 1997) activities.

Fungal endophytes are known to reside within tissues of plants without producing apparent symptoms (Bills, 1996); and are found in almost all plants (Stone *et al.*, 2000; Azevedo and Araujo, 2007, Raghukumar, 2008). They provide several benefits to their hosts in the form of direct and indirect defences against herbivores (Clay, 1990; Wang and Qiu, 2006), protection from pests (Shrivastava *et al.*, 2010), improvement of yields (Clay, 1994) and many more. Endophytes have a multifarious potential in research with respect to their applications in agriculture, soil science and production of crops for biomass and biofuels (Ryan *et al.*, 2008); phytoremediation (Ho *et al.*, 2012), forest management, production of new drug and anti microbial compounds (Pirttila and Frank, 2011) and as sources of novel products for agricultural, medicinal and industrial uses (Molina *et al.*, 2012). Endophytes in the tropical regions have received less research attention in comparison to their temperate counterparts (White, 1987) and scanty scattered literature is found on their association with tropical grasses. Therefore the current investigation was carried out to determine the assemblage of fungal endophytes from lemon grass.

MATERIALS AND METHODS

Ten lemon grass plants were collected from Jnanadweepa, Vidya Prasarak Mandal's Thane College Campus in the city of Thane, in the state of Maharashtra, situated in the western coastal region of India; during November 2011. The samples were collected in sterile polyethylene pouches, labeled and transported for further work to the department of botany in B.N. Bandodkar College of Science, Thane. The samples were placed in a refrigerator and processed within 2 hours of collection.

The lemon grass plants with entire shoot and root systems were washed thoroughly in running water and air dried. Rhizomes and leaves were cut into pieces, 2-3 cm in size and immersed in 70% ethyl alcohol (v/v) for 1 min followed by subsequent immersion in sodium hypochlorite (3.5% v/v) for 3 min. The pieces were rinsed three times in sterile distilled water and dried on sterile blotters to ensure complete drying. The pieces were further cut into bits/ segments of 3 mm X 3 mm dimensions with the help of a sterile blade. Three hundred segments from leaves and rhizomes were plated aseptically on 90 mm petri plates containing Malt Extract Agar (Hi Media), Potato Dextrose Agar (PDA) and Plant Extract Agar (PEA) respectively, supplemented with chloramphenicol (50 mg/l) to suppress growth of bacteria. Plant Extract Agar medium was prepared by substituting potato in PDA with concentrated extract of the plant; prepared by boiling 100g lemon grass leaves in 1litre distilled water till the quantity becomes half and using this extract to prepare the medium by adding dextrose and agar. The efficacy of sterilization was made sure by the method suggested by Deshmukh *et al.* (2010). The plates were incubated at 25⁰C with 12 h light and dark cycles for up to 6 weeks, examined periodically and each fungal colony that emerged from the segments was transferred to antibiotic-free Potato Dextrose Agar medium for identification. Endophytic fungal isolates were identified on the basis of culture characteristics, morphology of fruiting body and spores.

The colonization frequency, expressed as percentage was calculated as mentioned by Bharathidasan and Panneerselvam (2011) as follows: %CF = Number of tissue segments colonized by a fungus / Total number of tissue segments plated X 100.

RESULTS AND DISCUSSION

A total number of 128 isolates were recovered from the 300 segments of *Cymbopogon citratus*; belonging to ascomycetes (13.5%) viz. *Chaetomium bostrychodes* Zopf, *C. globosum* Kunze and *Emericella nidulans* (Eidam) Vuill.; coelomycetes (22.7%) viz. *Colletotrichum dematium* (Pers.) Grove, *C. gloeosporioides* (Penz) Penz & Sacc., *Pestalotiopsis* sp., *Phomopsis* sp. and *Phyllosticta* sp.; hyphomycetes (36.3%) viz. *Alternaria alternata* (Fr.) Keissl., *Arthrinium phaeospermum* (Corda) M.B.Ellis, *Cladosporium cladosporioides* (Fresen.) G. A. de Vries, *Nigrospora oryzae* (Berk. & Broome) Petch, *N. sphaerica* (Sacc.) E.W. Mason, *Alternaria* sp., *Drechslera* sp., *Fusarium* sp. and sterile mycelia (27.2%). The isolates belong to 16 different fungal species and 6 sterile mycelia. The results are presented in Table 1. The colonizing frequency (Fig. 1) of leaf blades of lemon grass samples collected for study was 56% and that of rhizome samples was 29.3%. The colonization frequency of endophytes was higher in leaf segments than rhizome segments. This result is in conformation with Goveas *et al.* (2011) who reported differences in colonization frequencies between tissues of the same plant. The colonization frequency is also reported to vary with time (Liu *et al.*, 2010), physiological nature of host tissue and environment (Suryanarayanan and Vijaykrishna, 2001).

In the present investigation, 22 different fungal species, inclusive of six different sterile forms, belonging to 18 genera were isolated. There were significant differences in the pattern of endophytic colonization of leaf blade and rhizome. Leaf blade samples were most densely colonized by *Cladosporium cladosporioides* (14.25%) followed by *Drechslera* sp. (9.75%) and *Colletotrichum gloeosporioides* (6.75%) while those of the rhizome showed highest colonization by *Cladosporium cladosporioides* (8.75%) followed by *Colletotrichum gloeosporioides* (3.40%) and sterile mycelium 3 (3.0%). The colonization frequency of some of the fungi such as *Cladosporium cladosporioides*, *Drechslera* sp., *Alternaria alternata* and *Colletotrichum gloeosporioides* was more in leaf blade. The data is in agreement with the findings of Rosa

et al. (2009) who reported a wide range of fungal endophytes from another plant belonging to the same family as lemon grass. The findings also tally with those of Petrini (1991) who reported a large assemblage of fungal endophytes from leaves of a single species. Shankar and Shashikala (2010) reported isolation of endophytic fungal genera such as *Alternaria*, *Aspergillus*, *Chaetomium*, *Cladosporium*, *Curvularia*, *Fusarium*, *Gliocladium*, *Nigrospora* and *Phyllosticta* from grasses in southern India, most of which were also recovered in the present investigation. There was not much of a difference in the isolation spectrum of the endophytic fungi from segments plated on Potato Dextrose Agar and Malt Extract Agar; however Plant Extract Agar, revealed a lesser range of endophytic inhabitants from the segments plated over it; and also recorded a much slower growth rate of the endophytic fungal colonies, which is most probably due to reasons attributed to nutritional aspects.

CONCLUSION

The finding of a wide range of endophytic fungal species in lemon grass suggests that there is necessity of larger surveys of various grasses in this area; based on specific geographic locations and carried out in different seasons, for recording fungal endophyte associations and the extent richness of endophytic fungal biodiversity of the region. The study assumes importance since the extract of lemon grass exhibits anti-carcinogenic, anti-microbial and a host of other properties useful to mankind. The association of the endophytic inhabitants with these properties would give new meaning to the largely unknown relationship between fungal endophytes and their associate host.

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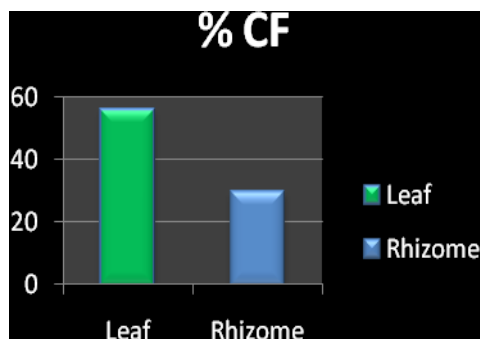
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Table 1. List of fungal endophytes isolated from leaf blade and rhizome of *Cymbopogon citratus* and their colonization frequency

No.	Fungal Endophyte	Leaf Blade			Total % CF	Rhizome			Total % CF
		Medium				Medium			
		1	2	3		1	2	3	
1	<i>Alternaria alternata</i> (Fr.) Keissl.	+	+	+	5.00	-	-	-	-
2	<i>Alternaria</i> sp.	+	+	-	0.75	-	-	-	-
3	<i>Arthrinium phaeospermum</i> (Corda) M.B.Ellis	+	+	+	0.75	-	-	-	-
4	<i>Chaetomium bostrychodes</i> Zopf	+	+	-	0.75	-	-	-	-
5	<i>Chaetomium globosum</i> Kunze	+	+	+	1.50	+	+	+	1.50
6	<i>Colletotrichum dematium</i> (Pers.) Grove	+	+	+	2.25	-	-	-	-
7	<i>Colletotrichum gloeosporioides</i> (Penz) Penz. & Sacc.	+	+	+	6.75	+	+	+	3.40
8	<i>Cladosporium cladosporioides</i> (Fresen.) G. A. de Vries	+	+	+	14.25	+	+	+	8.75
9	<i>Drechslera</i> sp.	+	+	+	9.75	-	-	-	-
10	<i>Emericella nidulans</i> (Eidam) Vuill.	+	+	+	0.75	+	+	+	0.75
11	<i>Fusarium</i> sp.	+	+	+	2.25	+	+	-	2.25
12	<i>Nigrospora oryzae</i> (Berk. & Broome) Petch	+	+	+	0.75	+	+	+	1.50
13	<i>Nigrospora sphaerica</i> (Sacc.) E.W. Mason	+	+	-	0.75	-	-	-	-
14	<i>Pestalotiopsis</i> sp.	+	+	+	0.75	-	-	-	-
15	<i>Phomopsis</i> sp.	+	+	-	0.75	-	-	-	-
16	<i>Phyllosticta</i> sp.	+	+	-	3.25	-	-	-	-
17	Sterile mycelium 1	+	+	+	1.25	+	+	+	2.50
18	Sterile mycelium 2	+	+	+	0.75	+	+	+	2.62
19	Sterile mycelium 3	+	+	+	0.75	+	+	+	3.00
20	Sterile mycelium 4	+	+	+	0.75	+	+	+	0.75
21	Sterile mycelium 5	+	+	+	0.75	+	+	+	1.50
22	Sterile mycelium 6	+	+	-	0.75	+	+	+	0.75
	Total number of isolates				84				44

50 segments were plated for analyzing the frequency in each case viz. leaf blade and rhizome on Potato Dextrose Agar (1), Malt Extract Agar (2) and Plant Extract Agar (3) respectively; ‘+’: Present; ‘-’: Absent

Figure 1. Colonization frequencies of fungal endophytes in leaf and rhizome samples of Lemon grass



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STUDENT SATISFACTION INDEX (SSI)

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Students' satisfaction Index

In the 21st century we observe the growth in all the sectors and also in the field of education. People /customers are demanding high quality services and the supplier has to think of supplying quality product to satisfy the consumer. Students are direct receivers and participators for the higher education services. Our country is becoming a global supplier of intellectual manpower. There is great demand for education. By demand and supply rule many new colleges are established. But by the rule of survival of the fittest, the survival of the educational institutes depends on the quality of the education given, infrastructural facilities provided, available resources, extracurricular activities conducted in the college. As the younger generation are the torch-bearers of the century, their aspiration in the knowledge and information and communication technology (ICT) have to be fulfilled by the emerging institutions of higher learning. The students are also aware of the fast changing horizons of knowledge and to cope with the same, they have some expectations from the educational institutions. Hence it is essential to think of students' satisfaction Index by studying the facilities provided, efforts taken for students' activities up to their satisfaction. In this article, we will consider all the factors to be considered in establishing students' satisfaction model. The procedure for building a **Student Satisfaction Index (SSI)** are also described.

The student satisfaction survey is to be designed with comprehensive data of student experiences while studying at the institution. The goal is to determine the importance of a variety of issues and the satisfaction level related to those issues. This paper provides an insight on student satisfaction in a **Higher Education Institute (HEI)**. Students' opinions about the factors related to academic life are required in the form of a satisfaction feedback questionnaire. This survey should aim to investigate issues viewed as important to students by seeking their opinion on a number of factors related to teaching, assessment and infrastructure provided by the HEI. The reasons for collecting student feedback are:

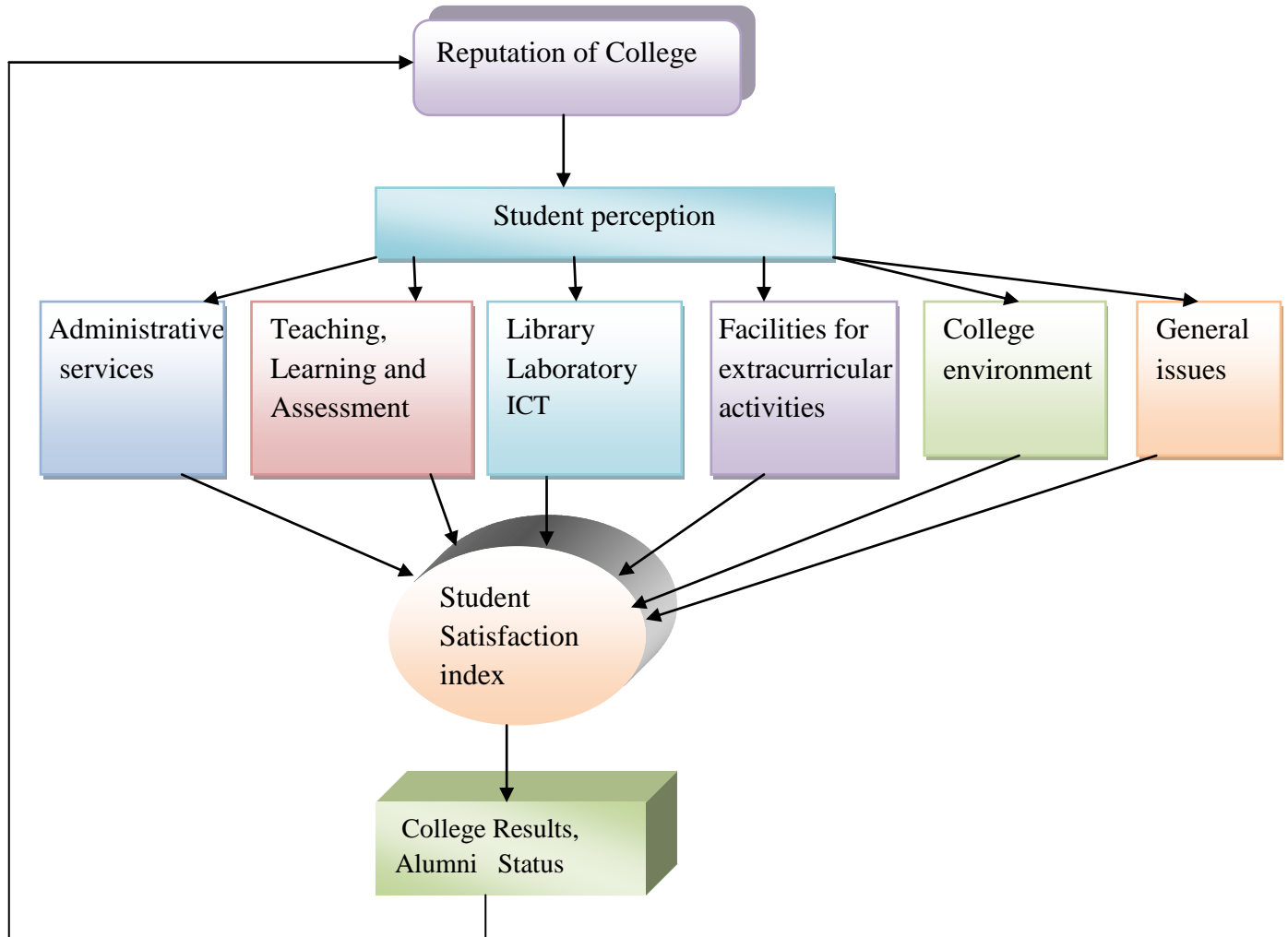
- ✓ to provide students the opportunity to give their opinion on their courses
- ✓ to encourage students' expression on their learning;
- ✓ to provide students with an opportunity to state their level of satisfaction with their academic experience.
- ✓ to allow institutions to set benchmark and to provide indicators that will contribute to the reputation of the Institute in the marketplace

The students' satisfaction survey is one way to get students' views on their academic experience and contribute what they considered as their values and what they thought of as important in an educational experience.

Students' survey contains important signals from our customers who expect high quality service and sometimes unfortunately do not get it. A collection of students' view on their learning experiences reveals good information and helps us to measure student satisfaction in HEI.

Based on the students' satisfaction survey, the six elements which can be used in calculation of the SSI are Administrative services, teaching, learning and assessment; resource centre services (Library, Laboratories ICT facility), Facilities for extracurricular activities, College environment and General issues. For these six factors weights can be assigned and by using weighted average Index can be calculated.

All these six elements are to be weighted according to the importance. Weights are to be assigned on the basis of the feedback from the students. These weights may change in the future due to changes in students' priorities. The SSI reflects the success of the institution in satisfying students' expectations. Therefore HEIs would like to improve their level of student satisfaction and should focus their impact on the administration, other essential services and should not neglect the services that could be called peripheral, such as infrastructure. Students mainly enroll themselves for higher education and hence more important aspect is teaching and learning. Therefore teachers must update their knowledge and have to adopt new teaching aids. College administration has to introduce new courses as per the demand in the global market and has to reconstruct the infrastructure according to the need. Due to the changing nature of the HEIs college administrators have to apply the customer-oriented principles which are used by profit-making institutions. SSI will also help in improving the Reputation of HEI.



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GLYPHOSATE-INDUCED IMPAIRMENT OF WHEAT PLANT GROWTH AND FORBIDDEN WEED

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ABSTRACT

Wheat proteins belong to storage protein class and have an important role during germination of seed. Weeds are very strong competitor for soil, moisture and fertilizers. Competition for water begins when root system of weed overlaps that of wheat in their search for water and nutrients. Weeds serve as the host for nematodes; diseases causing organism and rodents. Weed control strategies depend upon concentration of herbicide as well as upon seasonal changes, which changes nutritional values of crop/wheat. So attempts were made to study effect of glyphosate on morphological characteristic, total protein, total carbohydrate, chlorophylla/b ratio, percentage of flavanoid and photo system II activity of both weed and wheat in relation with soil.

Key words: Wheat, Weed, *Triticum aestivum*, herbicide, glyphosate, soil.

INTRODUCTION: Among the food crops, wheat is one of the most abundant sources of energy and proteins for the world population. Ninety-five percent of wheat grown today is of the hexaploid type, used for the preparation of bread and other baked products. Nearly all of the remaining 5% is durum (tetraploid) wheat, which is mainly used for making pasta, macaroni and biscuits. Wheat is characterized by a large genome size (approximately 17000 Mb), thus making the improvement process by any method is genetically challenging. The genetic improvement of the wheat has received considerable attention over the years from plant breeders with the purpose of increasing the grain yield and to minimize crop loss due to unfavorable environmental conditions. Weed - acts as competitor, attack by various pests and pathogens. Weed affects wheat adversely. It creates a competition to wheat in all respects such as absorption of water, minerals and salts, space etc. which leads to loss of productivity of wheat. The advantage of fertilizers added to soil is taken up by weed. Thus there is less supply of nutrition to the wheat plant. So the content of protein, carbohydrate and other nutritional factors decreases in wheat. Hence, there is depletion in quality of wheat, making it inferior for human consumption. Thus weed growth should be controlled to avoid the loss in productivity and low quality of wheat produced. Therefore, in this study, chemical method of weed control with the use of glyphosate is carried out. Glyphosate is a non-selective, translocated, foliage-absorbed herbicide that

controls a wide spectrum of annual and perennial weed species. Glyphosate is especially active on grass species. It is a systemic pesticide that, when translocated throughout the plant, inhibits the production of some aromatic amino acids essential for plant growth (Franz *et al.* 1997). The major natural metabolite in plant and soil is aminomethylphosphonic acid (AMPA). Attempts to enhance glyphosate phytotoxicity by reducing the carrier volume (Van et al. 1986) or by using various additives (Buhler and Burnside 1983) or chelating agents (Shea and Tupy 1984) have allowed for the use of reduced herbicide dosages, resulting in lower cost while maintaining effective weed control.

Material and methods:

Materials: Sulphuric acid, hydrochloric acid, nitric acid, , Folin Ciocalteu, casein glucose, Glyphosate (Glyphos from Cheminova). Distilled water used throughout the study.

Methods:

Soil analysis: Soil analysis is important factor to be studied as it affects the quality and quantity of wheat plant. Soil was collected from the campus of B.N. Bandodkar College of Science chedani bunder Rd. Thane (w)-1. Soil properties such as color, solubility, moisture, pH, minerals, and organic content were analyzed by Ross (1999) and Wright method (2001). In this method, saturation of soil with water and subsequent extraction under partial vacuum of the liquid phase for the determination of dissolved salts was carried out. Soil pH was determined by using pH meter. Soluble salts and minerals estimation was based on the measurement of electrical conductivity and spectrophotometric analysis. Quantification of bicarbonate and carbonate was carried out by titration with 0.025N sulphuric acid.

Field work: Cultivation was carried out in total field area of 200 cm X 130 cm by preparing small panes of soil of 60 by 60 cm, six in numbers. In which wheat seeds were sown, about 150g of wheat grains in each panes. Glyphosate in various concentrations was spread in each panes leaving one as untreated (control).

Estimation of protein, carbohydrate, flavanoid and chlorophyll:

Protein assay: For the extraction of protein 500 mg of wheat plant and weed was grind separately using mortal and pestle sodium phosphate buffer pH 7.0. After centrifugation at 5000 rpm for 10 mins. The supernatant was used for the measurement of protein using casein as a standard. (0.8 absorbance corresponds to 0.1 mg of protein). The assay was carried out by Lowry's method (Lowry 1951).

Carbohydrate: For the extraction of carbohydrate 500mg of wheat plant and weed was grind using pestle and mortar in minimum amount of ethanol, centrifuging it at 5000 r.p.m. for 10-20 minutes. The

supernatant was used for carbohydrate estimation Carbohydrate estimation was carried out by Phenol Sulphuric acid using glucose as a standard (2.6 absorbance corresponds to 22.6%).

Chlorophyll: For the extraction of chlorophyll 500mg of wheat plant/weed was grind using pestle and mortar in minimum amount of acetone, centrifuging it at 5000 rpm for 10 mins. Chlorophyll estimation was carried out in the supernatant. (Jayraman.1973)

Flavanoid: Total flavanoid content of the fraction was measured by using Aluminium chloride-colorimetric method (Woisky, R and Salatino A.1998) and spectrophotometrically.

Effect of modifiers: Effect of various modifiers on protein and carbohydrate on wheat plant was carried out. All chemicals (100 μ M) were used for study with 100 ppm of glyphosate was sprayed on wheat plant. Absorbance for protein and carbohydrate was observed at 660 nm and 490 nm. (Table1)

Figure 1 Effect of glyphosate on wheat protein and carbohydrate content.

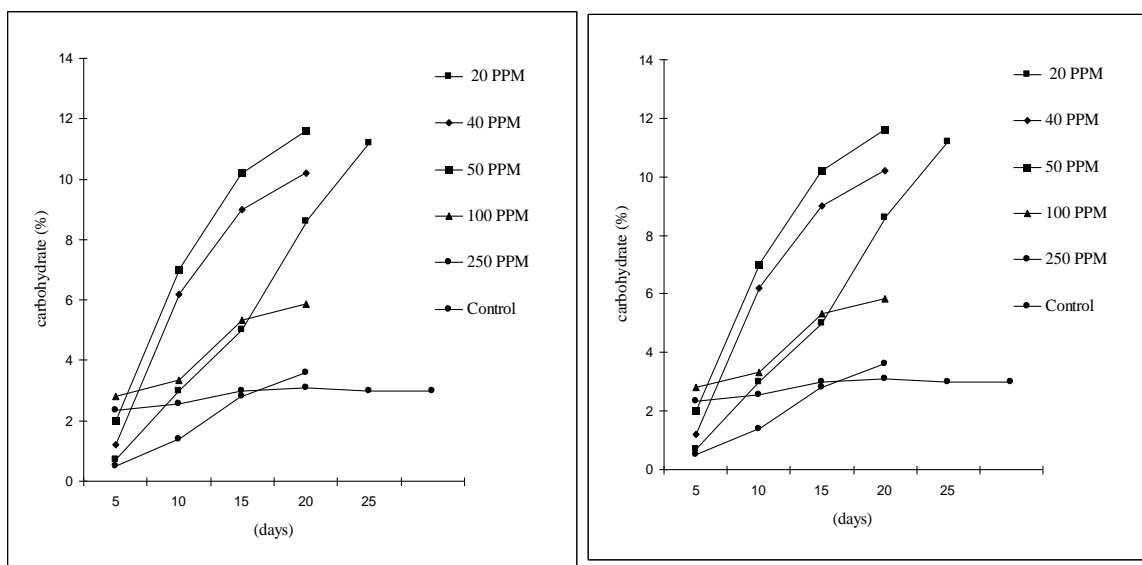


Figure 2 Effect of glyphosate on weed protein and carbohydrate content.

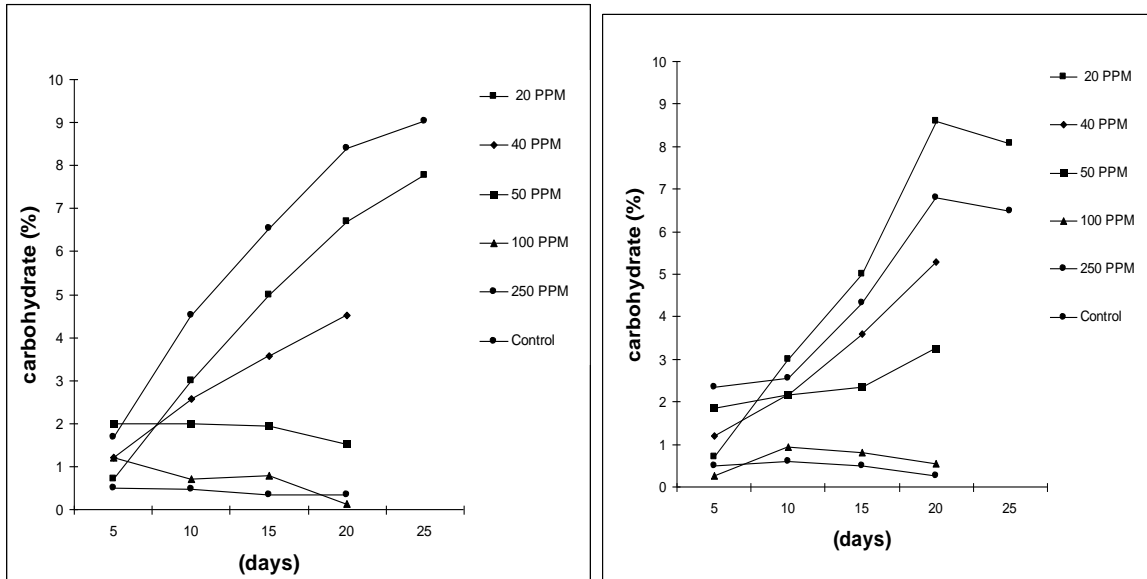


Figure 3 Effect of glyphosate on chlorophyll of weed and wheat leaves

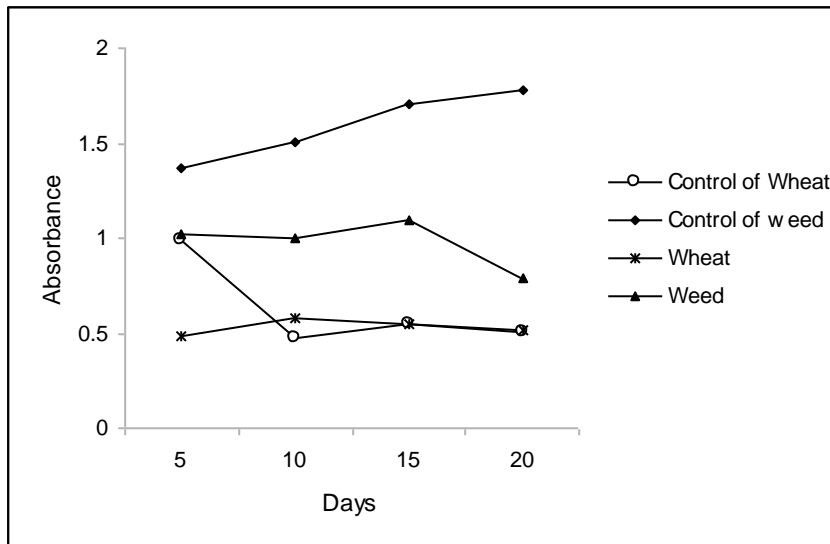
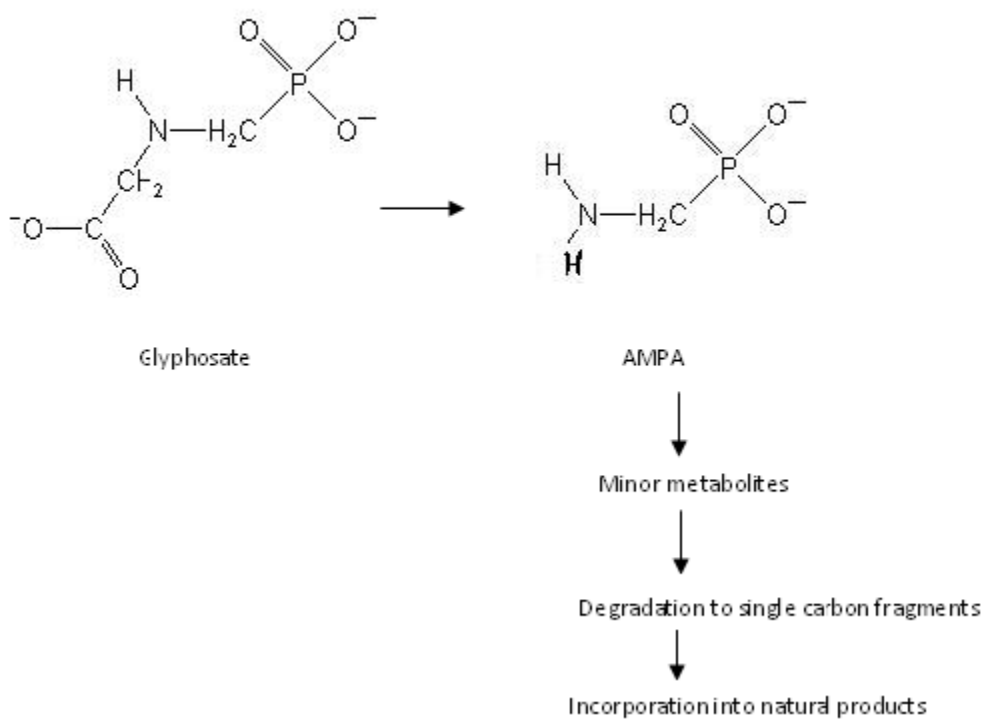


Table 1 Effect of modifiers on wheat plant

Sr. No.	Modifier	Protein (mg/ml)	Carbohydrates (%)
1.	NiSO ₄	0.06025	1.18
2.	CuSO ₄	0.04275	0.48
3.	FeSO ₄	0.043375	0.2
4.	ZnSO	0.049875	0.55
5.	NaCl	0.042875	0.4
6.	MnO ₂	0.0545	0.18
7.	AgNO ₃	0.018375	0.04
8.	Formaldehyde	0.0335	3.91
9.	Benzaldehyde	0.047875	0.73
10.	Thiourea	0.1364	1.09
11.	Aniline	0.089625	0.78
12.	Diphenylamine	0.02875	12.6
13.	Pthallic anhydride	0.0275	0.66

Figure 4 Metabolic pathway of glyphosate



Result and discussion: Soil analysis is the leading importance for the growth of crop. Soil used for entire impairment of wheat plant growth study was brown, partially insoluble with moisture(83.3%),pH-6.6, minerals- Fe^{2+} , Zn^{2+} , Ca^{2+} , Mg^{2+} , organic matter (4.5%).Brown color indicates presence of high content of organic matter which helps in photosynthesis whereas alkaline pH of 6.6 affects the quality of wheat and activity of glutase. Vitamins (3.5 mg) estimated in wheat seed and (4.0 mg) % in leaves needed daily for good appetite, digestion and healthy nerves and vision. A and B vitamins essential for the efficient use of protein by the body and from very much composed in dietary needs. Wheat Zn is important for skin healing and growth properties. Wheat with its high protein content is a key source of plant protein in the human diet. Solitary of the prominent targets for the relevance of transgene technology (selective marker-herbicide) for the nutritional improvement of wheat is targeted at enhancing the grain quality by increasing the protein content and essential amino acids such as lysine. According to fig 1 and 2, it was experiential that nutritional values of wheat increases. Glyphosate (20 ppm) has no effect on protein content as compared to control. For 40 ppm there is slight increase but at 50 ppm there is noticeable discrepancy which remains constant further. At 100 ppm of glyphosate, increase in protein is observed which remains almost constant till 4 months. Maximum carbohydrate content was observed when 50 ppm of glyphosate.100ppm glyphosate sprayed sample shows abruptly increases in carbohydrate content on 15th day and there is no change observed till seeding. Protein and carbohydrate content of weed went on depleting as the concentration of glyphosate was increased. Control of weed crop was observed after 75 ppm dose of glyphosate. Thus this concludes that wheat is resistant/tolerant to glyphosate where as weed is non-tolerant to glyphosate. The metabolic pathway can be summarized as shown in the figure 3.Glyphosate is metabolized to aminomethylphosphonic acid (AMPA) which is the main metabolite originate in plants. AMPA can further react with naturally occurring organic compounds, or degrade to single carbon fragments that are incorporated into natural plant metabolic processes. The nature of the metabolites is the same, only the relative distribution varies depending on the speed and extent with which glyphosate is converted to AMPA. Pre-plant application of glyphosate reduces the population of early emerging perennial weeds and also direct contact with the crop. Study on plant pigment-chlorophyll helps us to understand the photosynthetic system of wheat and weed. The results obtained shows that 20 ppm high chlorophyll content was observed which further increasing as existence. At 50 ppm it shows maximum increase at 15th day. Chlorophyll content went on increasing till 3 months and thereon it went on depleting. However in case of weed chlorophyll content went on declining with increasing glyphosate concentration. Total flavanoid content estimated is 105.8-141.8 μmol of catechin equiv/100g of wheat.

Morphological changes observed during the growth of wheat plant on 5th day were 5.75 cm in length and the color of it was fresh green. On 10th day it was 11 cm in length and there was no difference in color. On further days there increased in height with no prominent change in color was observed. The differences in response to carrier volume for glyphosate may be related to water hardness, surfactant concentration, and spray droplet dynamics.

Wheat plants that are tolerant to glyphosate application also have very good resistance to leaf rust when the glyphosate is sprayed on the plants for a period of up to three weeks prior to exposure to leaf rust infections. The resistance to leaf rust is due to the application of glyphosate, and not due to other compounds present in Roundup. Glyphosate can have adverse effects on other pathogens, including other rust fungi, additional investigation (Anderson, J.A., Kolmer 2005) of the fungicidal properties of glyphosate are warranted, with particular attention to the timing of glyphosate application relative to fungal infection it directly correlated the literature data.

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Thesis of M.P.Edu. On

A STUDY OF EFFECTIVENESS OF STRENGTH TRAINING PROGRAMME FOR PROMOTION OF FITNESS AND SKILL ABILITY OF VOLLEYBALL PLAYERS FOR BOYS AGED 14 YEARS

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Abstract

Sports play a major role in the lives of almost every individual players, coaches, officials and even spectators. The development of physical fitness, attainment of a level of achievement in sport label for young people including children of pre-Schooling age is necessary. In the present paper, historical development sports has occupied prominent place both in the physical as well as in the cultural aspect of the society is discussed.

INTRODUCTION

Sports play a major role in the lives of almost every individual players, coaches, officials and even spectators. Interests in sports is the results of several factors including more time for the leisure because of the fewer working hours per week and more vacation period. There is also increased emphasis on physical fitness awareness and health consciousness which demonstrated through greater participation in Jogging, playing games like Basketball, SoftBall, Skipping and aerobics and going to gym as a Life time sports. Through sports participation children and adults; not only improve and maintain fitness but also develop overall functional capacity of organs, skill groups and personal satisfaction and enjoyment. Everyone must have full opportunity in accordance with his National tradition of sports for practicing physical education and sports. The development of physical fitness and attainment of a level of achievement is an in sport label for young people including children of pre-Schooling age.

For the aged and for the handicapped to develop their personalities to the fullest extent through physical education programmes by shifting their requirement¹ is necessary

The Competition in all fields of sports and Games has developed to such high degree that no coach or player can offered to neglect the application of scientific principles that can give him an additional advantage in the high level competition. This approach definitely eliminates the changed factor that is hit or miss method. Besides providing a definite and scientific procedure for teaching and analyzing technique is essential in corresponding to his natural gift. Special opportunities must be made order to obtain the most efficient performance.²

In the process of the historical development sports has occupied prominent place both in the physical as well as in the cultural aspect of the society. Its social significance continues to sour. Sports which at present are becoming internationally more wide spread³.

Today playing games and sports exist as highly organized institution. Since the revival of the Olympic game by Baron-De-Cubertin.in 1986 ever increasing international interest and participation in the games and sports has been observed. Training has been accepted as highly scientific process involving the use of scientific method and physical investigation⁴.

In the field of international competition it is difficult to distinguish top players from one another therefore fitness aspect is an important consideration for them It is evident that today world's most

sporting nation are very much conscious of their fact and concentrate on the development of these basic physical fitness components and related aspects of important of different game.

1.1 THE GAME VOLLEY BALL

The game of volley ball is most popular today, not only in India but also in the whole world. This game is preferred as it covers small area which is possible on the plains and hills both and it's less expensive unlike the other games and sports.

Volleyball is a team sports played by two teams on a playing court divided by a net. Volley ball was originated in the United States and now it is achieving the type of popularity in the US that it has received it on a global basis where it ranks only behind Soccer among participating sports.

Volleyball are of three type such as SMASH VOLLEYBALL, SHOOTING VOLLEYBALL AND BEACH VOLLEYBALL is played by six players of each team. The purpose of each team is to finish the ball into the opponent's court and prevent the other team from scoring so that the ball may be passed and smashed.

1.2 HISTORY AND DEVELOPMENT OF VOLLEY BALL

Volley ball is a typical American game. The game was invented in 1895 by Williams Morgan the physical director of Holyoke Y.M.C.A. to provide an opportunity for the recreation and relaxation for Businessman. In the Early stage the game was very simple with few rules and it consisted of hitting a Ball back and forth across a height net. The game develop rapidly under the patronage of Y.M.C.A's Director Society.

The first set of rules was published in1917 in collaboration with the national collegiate athletics association Volleyball. It received due recognition and Impact in 1925, when twenty seven team from eleven states participated in Y.M.C.A's national championship. The game steadily progressed during these years and it has now become one of the most popular recreational major sports in ground, industrial plants and among the armed forces. The announcement by the United State Air force head quarters for the second wide Air force Championship was a clear indication that Volleyball has become a major sports in the Air forces recreational programme. The game is comparatively inexpensive and does not require much space. It offers opportunities for the development of strength, Endurance, neuromuscular skills and team play. Intensive Volleyball is rigorous, exciting, and spectacular. But the game is highly adoptive to young and old. It is an ideal game for the rural population.

1.3 VOLLEYBALL IN OTHER LANDS

The Y.M.C.A Secretaries and their physical directors were responsible for spreading Volleyball in Foreign countries. Today the game is largely played in Canada, Holland, Sweden, Poland, Czechoslovakia, France, Italy, Russia, Israel, China, Japan, Philippines and India. Thus it is now an international game.

The international volleyball association was formed in 1947 with its head quarter in Paris and twenty-three countries represented in the association. The first volley ball championship was held in 1949 at Prague, the stadium was packed to its fullest capacity. The Russians axed the championship by defeating the Czechoslovakia in the final.

The second world volley ball championship was held in 1952 from august 17 to 29 at the control stadium of Dynamo short club in Moscow, teams from the following countries participated: U.S.S.R., Czechoslovakia, Bulgaria, Rumania, Hungary, Poland, France, Finland, Lebanon, India and Israel. It is reported that main teams were divided into three sub-division which formed the final 'A' group in which the first six places were contested the other team constituted the 'B' group in which the places beginning from seventh were determined. A team received one point if it won and no points if defeated. A team winning the title was awarded a prize and the member of the team winning was awarded GOLD, SILVER and BRONZE medals respectively.

1.4 VOLLEYBALL IN INDIA

Going back to the history of games in ASIA the sub continent of India was the first country where the game of Volleyball was introduced in 1900 by Dr. Gray a Physical Director of Y.M.C.A. Originally volleyball was started with 16 men system but subsequent brought to 6 men system which has already been standardized in USA in the 5th Asian games held in Shanghai (CHINA) in 1921. This 16 men system was changed in 12 men system and then in 1923 it became 9 men system in JAPAN. This system constituted for a long period under the title of 9 men system even during the Asian Games held in Jakarta in 1962 Volleyball matches were played in two system 9 men system

and 6 men system (international rules) LEABON was the first country of Asia which got affiliated with the International Volleyball Federation in 1949 followed by Japan, Philippines and India in 1951.

In 1954 the Asia Volleyball Confederation was established on the occasion of 2nd Asian games in 1955. The men's 1st Asian games volley ball championship was organized in TOKYO (JAPAN). In 1958 the game of volleyball was adopted as one of the main event of ASIAN GAMES.

Since this can be played very conveniently in the indoor gymnasium the developed countries and the developing countries of Asia have been playing this game indoor for quite some time volley ball has developed tremendously in the World and number of federation affiliated with the International volleyball federation has risen to 156 at the time of its congress long beach in 1984. The number of players in the world is estimated to be around 90 million.

1.5 DEVELOPMENT OF VOLLEYBALL IN INDIA

The Game of Volleyball was brought to India more than 70 year ago by Dr. Gray. Y.M.C.A College of Physical Education Madras took this game seriously and student trained there have taken the game to other parts of the Country.

The following are the main factors which helped in popularizing and raising the standard of the Game in India and formation of Volley Ball Federation of India. Prior to formation of V.F.I. the game was controlled by the Indian Olympic Association and at the time interstate Volleyball Championship was held at the every two years from 1936 to 1950 for men only. The first championship was held in 1936 at Lahore. In 1951 Volleyball Federation was formed and its first meeting was held in 1957 at Madras. Since then this championship has been held every year for men and women. Now the Nationals for mini, Sub-junior, Junior and Youth are also held every year.

1.6 RISE AND FALL OF VOLLEYBALL IN INDIA

Since the Formation of V.F.I. Indian team started participating in world championship. Asian Games, Asian Championship, Common wealth, Championship and many other International tournaments held in India and abroad. India won Gold Medal in Japan in 1955 at Invitation Asian meet.

In Third and forth Asian Games held at Tokyo in 1958 & Jakarta in 1962 India got bronze and Silver medal respectively. India got a major setback when no player was honored with Arjuna Award from 1936 to 1971. India also did not participate in any class competition from 1964 to 1973.

In the year 1974 when India participated in the Asian Games at Tehran, it got 5th place. It was told that India has lagged behind. With participation of Indian Team at junior and at Senior level it came back again. In the year 1980 in First Asian Championship & First Commonwealth Championship for men India got Third place in both the championships.

Moreover Indian team won many matches against visiting team to India and also out of India in International meets. India came up again when it won Bronze medal at Asian games at Seoul in the year 1986. Indian women team is yet to establish it supremacy. They have been participating in various competitions. They could manage a silver medal in the last SAF games losing to Sri Lanka in Finals.

1.7 THE CONCEPT OF EXERCISE

The concept of exercise was given by various thinkers as under Gross (1969)⁵ in his study took fifty-one subjects who performed two coincident timing task that required a horizontal arm movement and a whole body movement. A method of determining an medieval rhythmic pattern, required by the task employed,

was devised. Measures of the subjects rhythmic progression were also found to be unrelated to the success of a co incident timing task.

Later on McKenzie⁶ stated that exercise comprise of the movement designed to act on the muscles the blood nervous system skin and abdominal organ.

1.8 FACTORS RELATED TO VOLLEYBALL SKILLS

All the factors of motor performance described in the unit depends on varying degrees to muscle movement and thus strength is prerequisite to all the skills since it takes a certain amount of it to be agile to have power and to run fast. Strength is related to a type of endurance since the more efficient the muscle is in its work load, the longer it can function. However, while strength as a factor is inextricably related to other motor performance factor it remains an entire in itself and is the silent element in the whole. Strength itself is not an indecent of capacity nor fitness nor educability but merely the ability to apply force. Strength may be defined as the capacity of the individuals to exert muscular forces. This is received by individual's ability to pull, push, lift or squeeze on object or to hold the body in a hanging position. A Maximum strength is applied in these ways with a singular muscular contraction and the strength of muscle is in proportion to its effective cross section. Strength in excess of this amount will enable to perform more easily and effectively. Strength is one of the most dynamic factors of motor performance and is subject to improvement.⁷

In volleyball explosive strength play vital role. The spikers have to jump to spike the ball which requires explosive strength in legs to come up with demand, therefore it is essential pre-requisite of volleyball. Endurance has been identified as another factors required in acquiring better skills in Volleyball. It is result of physiological capacity of the player to sustain movement over a period of time. Endurance is of two kinds one is associated with factor of strength, where as the others is associated with circular-respiratory system. The two types are related, however, in the first type associated with strength, the individual with endurance has and ability to continue movement in such a situation where the muscle or muscle group being used are loaded heavily. Naturally, the stronger is able to work over a longer period of time than the weaker person. However strength in itself does not provide the entire answer to muscular endurance. A strong muscle can improve its endurance by developing more efficiencies that it recovery rate will be faster. Such endurance is characterized by the ability to continue repetitive action with a heavy load at maximum speed or short period of time. Volleyball players go for spiking, placing, defence & offence movements take place in close context match to play with full pace endurance is require to volleyball players. The adjustment in the heart, lungs & circularity system which has just been maintained can be made more efficient through training. The best type of test measure this fact of motor performance is distance running.

Power is recognized as one of the most basic components of movement with special reference to Volleyball. It is capacity of individual to bring into play maximum contraction at the faster rate to speed. Power is an explosive action and it is equal to the product of force times velocity, where force has to do with muscle strength and velocity with the speed with which strength is used in motor performance.

Power is a mechanical principle which is concerned with propelling the body or projecting its parts in a force ball, explosive manner in the shortest period of time in Volleyball. It is ability to release maximum muscular force at maximum speed. This power factor is characterized of the superior athlete, Speed and force are combined in athletic performance for high standards of excellence.

The most successful athletes, of course be the individual who has superior strength exceptional speed and the ability if effectively co- ordination them for integrate them into explosive action for excellent performance. An addition to the factor of speed and strength power is limited by such factor as weight, muscle viscosity and body structure.

The other essential factor for performance is speed Generally, when Speed is discussed, legs speed in short running and jumping activities in Volleyball are important, but speed like reaction time.

Concerned many body parts and may vary from one part to other. In general speed may be defined as the capacity of individuals to perform successive movement of the same pattern at the faster rate. Speed of muscle contraction would appear to be an innate quality but certainly speed of movement used in running

the sprints or running any in any game such as football, can be improved through training in the proper techniques and through continuous practiced in the co-ordination of movement. As in all motor performance there are limiting factors to speed. The rapidly of movement is affected by body weight, body density, muscle viscosity and such mechanical and structural features as length of limbs and flexibility of joints.

The speed required in sprint is not same in volleyball. The movement ability is at faster rate essential to volleyball players. One of the important features influencing skill development in Volleyball is agility. For defence & offence players have to move in different directions. This factor is revealed by the ability of body or part of the body to change direction rapidly and accurately. Measures of this quality test the ability of student to move quickly from one position. Ability involving co-ordination quickly and accurately the space to another big muscle of the body in a particular activity. These rapid changes in movement pattern by the whole body or some of its parts have been measured by such test time as dodge run, obstacle run, Zigzag run, sidestep, and squat thrust etc. One level of agility is achieved, it is probability result of innate capacity and training and experience. Certainly agility plays an important role in physical education activities. Specially, in such events as gymnastic, diving, basket ball poll vaulting, hurdling, high jumping and in the maneuvering in the ends and backs in football including volley ball. It is revealed to a great extent in sports involving efficient foot work and quick changes in body position. Agility is more effective when it is combined with high levels of strength endurance and speed while it is somewhat independent on ones heritage it can be improved.

1.9 THE CONCEPT OF STRENGTH TRAINING

Strength training is concerned with improving condition of body in terms of strength, power & endurance through the use of repetitive movement (or attempted moment in the case of isometric exercise) against resisting load of kind. The dictionary meaning of strength training is given as below. A system of condition (as for track or any game) in which an endurance usually concentrating on those muscle mostly used in sports. The athlete normally schedules weight progression that permits him to increase stamina and strength in an orderly and gradual manner.

1.10 STRENGTH TRAINING AND VOLLEYBALL

The game of volleyball is developing very fast in these days. The game is very aggressive in nature the skill to be performed very relational and accurate. The motor components fitness which should be developed among the volley ball players are strength, flexibility, endurance, power & agility which could determine the performance in the game of volleyball. So the game of Volley ball requires high skilled players to exhibit motor performance. A volleyball player should posses enough strength & endurance, at the same time he should be flexible and agile.

A systematic strength training programme perhaps very much useful in almost every sports, like smashing in volleyball requires much strength to the players, so strength training could be much more beneficial for all specially volleyball players to deliver the skill more efficiently. In the past decade strength training has become so popular and inversely used that it has throw almost all the prejudice that one surrounded it. Now strength is reorganized as vital necessity for many sports. The easiest method of gaining all round bodily strength is by the use of sensible strength training.⁸

Not only people use weight for competitive weight lifting and body building, but many sports men and sports women for increasing number every year and use strength training to better their performance. Certain sports clearly prefer strength training but there is still a gap in rendering proper training due to lack of professionally qualified people. This problem can be solved with the science of strength training Strength training need to be adapted to the particular sports because need of all sports is different. Thus player of volley ball need to practice a totally different type of strength training from that of football players. In the certain cases specially in the heavy throwing events in athletics, the strength training will be similar to the type that actual strength is not as important as local muscular & the endurance therefore training is altered for that activity. A weightlifter will speed the bulk of his training period on

actual weight lifting. Strength training as a supplement to this to help build his strength, power endurance of muscular & improved fitness.⁹

The type of training which sportsman undergoes is dependent on the activity he is interested. No of study had been conducted to see the effect of strength training programme for the promotion of fitness and a skill ability of different sports. A sport like Volleyball need explosive strength, speed of movement, agility endurance, flexibility for better performance to develop these requisites. Number of professionals is trying this study also a small attempt in this regarding. So the scholar selected following topic for the purpose.

1.11 STATEMENT OF THE PROBLEM

The above discussion and research reports presented in review of literature have revealed that strength training has become an imminent training method for improving any sports performance. It has become that strength training is not useful for the weightlifters but also useful among different players including volleyball. However, it is not known today that how far the strength training can be adopted at school aged volley ball players for skill performance and fitness development. It was therefore thought desirable to conduct an experiment in his line. Thus, the research project entitled, “A Study of Effectiveness Strength Training Programme for Promotion of Skill Ability of Volleyball Players for Boys Aged 14 years.”

1.12 OBJECTIVE OF THE STUDY

The specific objective of the present investigation is given below:

- To assess the status of skill performance in volleyball and associated motor fitness of school volleyball player
- To design a strength training schedule related for the promotion of volleyball player's performance
- To conduct an experiment for recording the effect of scheduled strength training programme on improvement of volleyball skills and related motor fitness

1.13 HYPOTHESES

After going through various researches finding and going on researches, the research scholar formulated following hypothesis for the following study:

H1: Strength training exercises may improve the skills ability of volleyball players i.e., overhead volley, fore arm pass, service ability.

H2: Strength training may help to improve the level of physical fitness components i.e., arm/shoulder strength, abdominal strength, explosive power.

1.14 DELIMITATIONS OF STUDY

The present investigation has a large scope. To meet all the areas of the scope is not possible in a short period allowed to use. The researcher therefore thought to delimit the study for its easy completion.

- The study was conducted on players of age 14 yrs.
- The study was delimited to certain selected strength training exercises
- As training intervention number of exercises is six only.
- The total period of experiment was only for six week.
- The study was conducted on certain selected volleyball skills bump to set, over head volley, services.

- Further it also limited to certain physical variables. i.e., sit-ups, pull-ups, vertical jump, leg extension & flexion, shoulder press, chest press.

1.15 LIMITATIONS OF THE STUDY

- The researcher recorded some shortcoming or faults may take place while conducting the actual experiment as follows
- Diet, health, habits and style of the day to day living of the subject can not be controlled.
- Except selected strength training exercises no other special technique of volleyball will be given to the subject.

1.16 OPERATIONAL DEFINITION

PHYSICAL VARIABLES

1) Strength -

By Hockey¹⁰ “it is the ability of muscle group to exert force against a resistance”.

By Watson¹¹ “strength is the maximum force that can be developed By Barrow¹² “explosive strength is the ability to release the maximum force in an explosive manner within the shortest possible time”. during muscular contraction.

Endurance enables a sports person to maintain rhythm concentration and mental alertness during training and competition. Endurance help in the maintenance of good health, improves resistance of the body against general infections and cures various cardio-respiratory and metabolic disorders.

3) POWER- It is the capacity of an individual to bring into play maximum muscle contraction at the fastest rate of the speed.¹³

4) SPEED-Speed is defined by Clark¹⁴, as rapidly with which a movement or successive movement of the some kind may be performed.

- It is the ability to respond to a given stimulus as quickly as possible
- It can be defined as the maximum speed of contraction of a muscle or a chain of muscles in a single course of movement.
- It can be defined as the ability to maintain maximum speed of
- Locomotion over as long distance as possible for maximum possible duration.

5) AGILITY-

Agility is generally defined as the ability to change direction quickly and effectively while moving as nearly possible at full speed¹⁵.

1.17 SIGNIFICANCE OF THE STUDY

The present study has been conducted with a view to meet the following achievement. The study will provide the idea that strength training may be benefited for skill development in other games.

- School physical education may consider strength training for a fruitful means for improving overall sports performance for school children.
- Further research may be supported to improve other skills of volleyball which could not be included in this study
- This project report will support the efficacy of strength training in improving motor qualities needed in other sport.

¹A.K. Bhattacharya, “National sports and responsibilities”, All India Seminar On Problem Of Physical Education And Sports For The School Going And Non School Going Youth Reports PAPER. L.N.C.P.E. (1981), P.15

²R.Chinappa P, “Principle of scientific coaching,” New Delhi: Ashish Publishing House, (1993), p.1.

- ³L. Matveyev, **“Fundamentals of sports training,”** MOSCOW: Progress Publication, (1981) pp. 6-9.
- ⁴S.Mathew, **“A study of the selected joint exercise for the development of physical fitness as required by basketball players,”** Unpublished Masters Dissertation, Submitted to University Of Bombay, (1990) P.1.
- ⁵Joel E.Gross, **“Realation of the pattern of movement including rhythmic and terminal success,”** Research Quarterly, 40:01(March 1969), p 55.
- ⁶T. Mckenzie, **“Exercise in Education and medicine,”** Philadelphia W: B. Saundres Company,(1924), 61.
- ⁷H. M. Barrow & Rosmerry McGee, **“A practical approach to measurement in physical education.”** Great Britain: Published by Henry Kimpton Publishrs,(1971), pp.120-121.
- ⁸M.Webster, **“Webster sports dictionary”** USA: Merrion Webster Inc. Publishers Springfield, (1963), 79.
- ⁹G. Kieley and J.G.Body , **“The manual of strength training,”** Philaeiphia :An Imprint Of The Hutchinson Publishing Group, (1978);p.3
- ¹⁰R.V.Hokey, **“Physical Fitness,”** Missouri: A Division Of The C. V. Mosby Company Westline, Industrial Drive, St Louis, (1983), pp.14.
- ¹¹A.W.S.Watson, **“Physical fitness and athletics performance,”** Philadelphia: Leas Flbiger,(1977),p.220.
- ¹² loc cit, p.121.
- ¹⁴H.H.Clark, **“Application of measurement in physical education,”**Eaglewood cliffs, N J Prentice HALL inc.,(1976),p.173.

REVIEW OF LITERATURE

Evan¹ studied the relative effect of weight training and weight lifting on the development of strength and endurance in university of Washing ton males. The weight training programme consisted of 10 barbell, 5 dumbbell and two exercise performed consisted of 7 barball, exercises including the 3 olympic lifts performed with 3to 5 RM. Both the groups were tested and after 10 week of training with the University of Washington weight training test with 7 exercises performed for maximum repetition (endurance) and three exercises for maximum lifts (strength) both the group gained significantly in the strength and endurance at the $p < .05$ level. The weight training group showed slightly greater gain in strength and endurance but the difference was not significant at the $p < .05$ level

Marian² conducted a study were college male ($n=64$) demonstrated muscular strength and endurance in arm flexion, forearm extension, thigh extension and leg extension ANCOVA was used to compare treatment effect of 2 training programme and the relationship between strength and endurance was determined through correlation. Results were somewhat conclusive for 1 test of endurance, were almost significant for another and insignificant for two of the test.

Price has selected students ($n=70$) at random, who were divided into 3 exp. Group and 1 control group. The control did not engage in physical training during the 1 week period between pre and post test the weight training design was of three fold, 1set of 35 reps. 3sets of 8reps. and 4sets of 2 rep. For A, B, C respectively training was accomplished twice weekly. An ANNOVA was run to determine the significance of change and it was used to determine if a relationship existed between increases in strength and endurance and between increase in strength and decrease in skin fold measurement. The post test revealed significant increase in strength and muscle endurance, decreases in all skin fold measurement 3 of 7 girth measurement, and percent body fat.

The Seatt general motor ability was administered by Ruth³ to college women who also took a 6 item objective test and were rated subsequently on mine intermediate swimming skill at the beginning of the semester. The subjective rating was used as the criterion for the objective test item the objective test had acceptable reliability and validity for use at the intermediate level but general more ability showed if relationship to achievement in intermediate swimming.

¹S.L.Eavan, "The relative effects of weight training and weight lifting on the development of strength and endurance in university of Washington males," Completed research in Health, Physical Education and Recreation,9:134, (1967), p 34.

²L Marion, "A comparison of the effects of isometric and is tonic training programmes on relative load isometric and isotonic muscular endurance," Completed research in Health, Physical Education and Recreation,13:206,(1971), pp 61-63

³W.M.Ruth,"A relationship between general motor ability and objective measures of achievement in swimming at the intermediate level college woman," Completed Research in Health,Physical Education & Recreation,5:102,(1963),p 106.

Jackson⁴ studied the relationship of grip strength and lateral wrist strength to skill in golf, for this grip strength and wrist strength was measured on 30 male students in required physical education classes of golf for 2 weeks, for one hour twice a week. The right and left grip strength in cross significantly. The correlation between the initial and the final grip strength and skill were most significant. Bilateral difference in grip and wrist did not correlate significantly with the skill.

In a study Venable⁵ conducted short-term weight training supplemented with electrical muscles stimulation (EMS) increases strength and power more than weight alone, 33 students (10to 12) were divided into groups ESM and weight (ES) n=13only (WO)n=12,and control (c) n=8. Weight consisted of lifting free weights 3days/weekfor 5weeks. The ES group was supplemented with EMS of the quadriceps 3 times/week.

Muscular strength (MS) was assessed using a 1 RM squat. To assess ballistic power (BP) vertical jump scores were converted to power using the Lewis formula and a modified Widget ergo meter test was used to determine peak power (PP) and time to peak power (TPP). The ES (20.6%) and WO(20.7%) groups increases significant ($P<0.05$) in BP, with WO groups having a larger again ($P<<0.05$) than the ES groups. These were no significant changes ($P>0.05$) in PP or TPP for any groups. In conclusion short term WEIGHT supplemented with EMS does not appear to enhance strength and/or power gains over weight alone.

Ann et al.⁶ concluded a study with a purpose to determine whether or not participating in a weight training programme could increase upper arm and shoulder strength and also determine if participation in systematic genetic exercise programme. Using isometric and isometric contraction would show significant result. University women (n = 12) composed the experimental group and performed 3 separate exercise twice a week for 8 weeks in to regular exercises .The control group consisted of 42 women .All participants in this study were given the bent game arm hang test before and after the 8 week period. The investigator concluded that a weight training programme produced significant increase in selected measures of upper arm and shoulder strength.

Arnold⁷ studies in the context of the effects of a weight training programme on under developed junior high school boys. He selected eighty four high school boys were selected by their standing the class as measured by the California physical performance test, they were paired by initial test score and assigned at random to eighteen training or the exercises group. They were rated at the conclusion at the week

⁴D.L. Jackson, "The relationship of grip strength and lateral wrist strength to skill in golf," Completed Research in Health, Physical Education and Recreation, 9:47,(1965), p 43.

⁵M.P. Venable, "Transutaneous stimulation for development of strength, power and time to peak power", M.S. In Exercise Science, (1988), p.78.

⁶M. Ann, et al., “**The effects of exercise generic exercises and weight training exercises upon upper arm and shoulder strength for women,**” Completed Research in health and Physical Education and Recreation, 10:64, (1964), p 61.

⁷F.G.Arnold, “**An experimental investigation of the effect of a weight training programme on underdeveloped junior high school boys,**” Completed Research, in health and Physical Education and Recreation 10:89, (1968), p 79.

Experimental period. The weight training programme was more effective in develop physical performance in the activities requiring large muscle strength such as softball throw for distance, pull ups and standing broad jump. It was less effective in developing performance in those activities requiring circulo-respiratory endurance and speed. Although a greater total increment occurred in the physical performance of the experiment al group, the weight training programme was not significantly better then the exercise programme in developing total physical fitness.

Genzmer⁸ studied the effect of 3 systematic weight training method in the jumping ability of high school basketball player. He divided 24 junior variety and freshman basketball team into 4 groups using the Mcloys classification index.

Charles Frank⁹ studied an effect of heavy resistance weight training of the pattern of muscular development as indicated by strength,girth, and endurance measures of the right elbow flexors, were studied using as subjects 34 grades 7 students. It was found that heavy resistance exercises did produce significant increases in size, strength, and endurance of the right elbow flexor.

Mary et al¹⁰, devised a wall test and a court test and tested in an actual class situations. The subjects were 30 SHS girls enrolled in a regularly schedule physical education classes. A scoring system used in the University of Wisconsin in tennis forehead drive test. The test provides reliable measures of performance on the overhead punch serve. The 2 proposed tests do not measure the same abilities, therefore, they may not be used interchangeable, this scoring system provides an invalid measure, and fails to discriminate among individuals. The reliability of soaring system using added trial scores was relatively high and was lowered when multiplied trial scores were used.

Noble¹¹ in his book expressed that one of the most interesting scientific and practical training programme involves the question of whether strength training can develop aerobic power in addition to strength or nt. It seems logical that if resistance is adjusted to allow repeated contractions, or the rest period incorporate aerobic activity, then both results can be achieved simultaneously. Still this natural hypothesis requires scientific validation. Aerobic capacity has been shown to increases with running training planned with an aerobic component has only improved aerobic capacity by 3.5% in 10 week training programme and 6% in a 20 week programme. Explosive power is an essential component for long lump performance. Movements in long jump performance requires an elicit elastic like behavior from the musculoskeletal system.

⁸Dane E. Genzmer, “**The effect of 3 systematic weight training method on the jumping ability of high school basketball player,**” Completed research in health, Physical Education and Recreation,” 3:84,(1961), p 43.

⁹Bready, C.Frank, JR, “**A Study of the effect of heavy resistance upon the battery of muscular development as indicated by strength, endurance and girth elbow flexions.**”, Completed Reasearch, in health, Physical Education and Recreation 4:47, (1962), p 70.

¹⁰F.Mary, et al, “**A study of tests for volley ball service,**” Completed Research in Health, Physical Education And Recreation,” 27: 280, (1985), p 88.

¹¹B.J.Noble, “**Physical of exercise and sport.**” Missouri: Mosby College of Publishing,(1996), p, 304.

METHODOLOGY

The main purpose behind this study was to analyse scientifically the effect of strength training in programme for skill and fitness development of Volleyball. The methodology adopted by the researcher for the present study is enumerated in the following parts. Research design, selection of subjects, selection of variables, selection of tests, selection of tools, criterion measure, orientation of subjects and tester's competency, description of test and variables, collection of data, testing procedure and training schedule.

3.1 Research Design

The researcher used a simple random group design for this study. In which two groups viz. One Group A experimental group another group B control group. The experimental subject received selected strength training programme for a period of six weeks, whereas the control subject did not receive such specific strength training except their

regular practice before and after the experiment all the subject of both the groups were pre and post tested by selected Volleyball skill test and associated fitness variable.

3.2 Selection of Subjects

A sample of forty male subjects selected at random from Childrens Academy Ashok Nagar, Kandivali (East) Mumbai. The subjects were divided in two groups randomly 20 subjects in each group. One group was treated as controlled group while the other one as the experimental group. The subjects age were range from up to fourteen.

3.3.1 Independent Variables

A set of five strength training exercises were chosen for the present study as independent variables in order to train the subjects as follows:

- Alternate dumbbells curl
- Chest press
- Abdomen(sit-ups)
- Leg press(leg extension and flexion)
- Shoulder press

3.3.2 Dependent Variables

The fitness and skill ability factors selected by scholar for the study i.e., fitness factors like Strength of arms and shoulders, Strength or endurance of abdomen, Explosive strength and Anaerobic power and skill ability like overhead volley, ball control and ball hitting power and accuracy were selected and treated as dependent variables to see the effect of training for six weeks.

3.4 Selection of Test

The researcher selected following tests¹ found to be more reliable to test the variables for the pre and post testing were selected.

¹ loc cit, pp.191-206.

Sr. No	Test Item	Variables Measured
01	Pull Ups	Strength of arms and shoulders
02	Sit Ups	Strength / Endurance of abdomen
03	Standing Broad Jump	Explosive Strength
04	Vertical Jump	Anaerobic Power
05	Overhead Volley Test	Overhead Volleyball Skill
06	Bump to Self Test	Ball Control
07	Service Test	Ball Hitting Power & Accuracy

3.5 Administration of Test

The tests selected to measure fitness components and volleyball skills were administered during pre and post on control and experimental group. A total of seven tests were administered for 3 alternate days. They were given proper instructions to participate in each event. The testing period was 2 hours in morning from 6.30a.m to 8.30a.m.

Instruction:

You must not lift your knee or assist your pull ups by kicking. You must return to hang position with arms fully straight. You will not be permitted to swing, only one trial is permitted.

Scoring: One point is scored each time the students completes a pull ups. Part score do not count.

3.5.2 Sit Ups Test (Fig No 2)

Purpose: To measure abdominal strength or endurance

Facilities and equipment: Mats may be used if it is available, otherwise the floor is satisfactory.

Procedure:

The student lies flat on his back with knees straight and his feet approximately two feet apart. His fingers are interlock and placed behind his neck. His elbows are flat against the floor or mat, his feet held by partners. One single start, the students start performing sit up touching the left elbow to the right knee, returns to the original starting position. Sit up again and touches the right elbow to the left knee and return.

Instruction:

Your fingers must remain interlock and in contact with the back of the neck all the times. You may curl up from the starting position your knees must be straight during the sit ups.

Scoring: One point is recorded for each correct sit up

Purpose: To measure the leg power.

Procedure:

The students stand behind a take off line with his foot several inches apart. Preliminary to jump the student dips his knee and swings his arms backward. He then jumps forward by simultaneously extending his knee and swinging his arms forward. Three trials are permitted, measurement is from the closest heel mark to the take off line. Indoor administration is best accomplished by placing a tape measure on the floor and at right angles to the take off line.

3.5.5 Volleyball Tests

Purpose:

To measure the volleyball skills necessary in the modern power volleyball game.

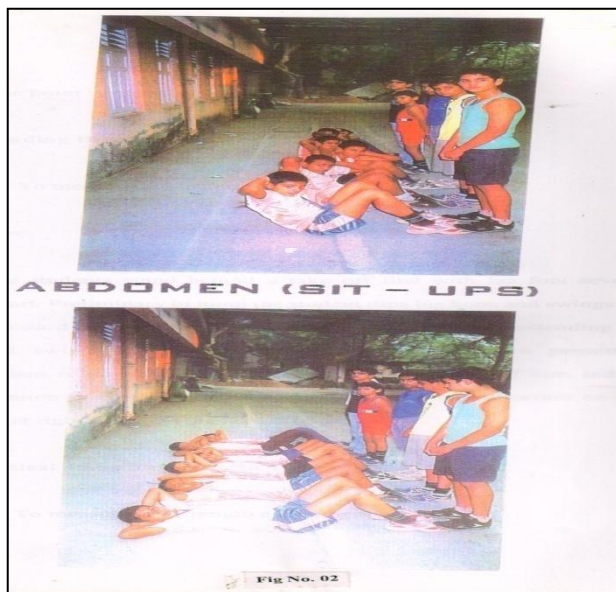
3.5.5.1 Overhead Volley Test (Fig No 5)

Purpose:

To test the player's ability to set pass and control the ball with the finger pads of both hands.

Procedure:

The student tosses the ball up to begin each trial and volleys the ball above the head with two hands with finger tip control, and with a full extension of the arms. To score the ball has to reach or go above the twelve feet height, and the player has to remain in the area with at least one feet. Each time if the control is lost, the player recovers his or her own ball with the count restarting at zero. Dropping the ball, catching the ball, using one hand, bumping the ball or using an open underhand hit, constitute loss of control. A student who permits the ball to come to a visible rest in his or her hand is warned the first time and called on a loss of control the second time. If the ball hits the wall or is below the twelve feet height or both of the student's feet are out of the area, the volley is disallowed. This does not return the count to zero.



study have been presented below in tables 1.

Variables on Pre and Post Tests :

The mean performance scores of the subjects in the physical fitness variables of control group have been presented in table 1. The same is also presented graphically below.

In the case of **Vertical Jump** test the mean performance of control group in the pre and post tests, were **25.30 (SD = 4.0)** and **26.85 (SD = 3.38)** respectively. The mean difference is **1.55 with SE_M = 0.83**. The 't' value does not show significant improvement in **Vertical Jump**.

CHAPTER IV

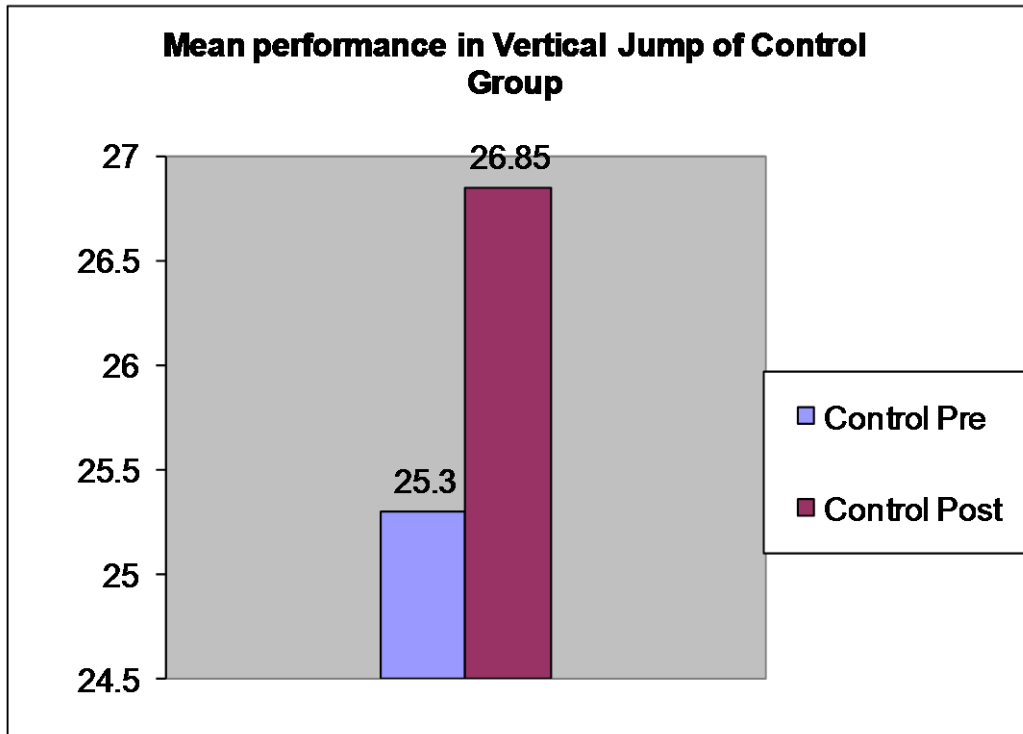
ANALYSIS AND INTERPRETATIONS OF DATA

The experimental data collected on pre and post test on physical fitness and skill ability variables have been presented and analyzed in this chapter.

The data were arranged systematically in tabular forms associated with graphical representations and were interpreted logically considering the scientific values. The results of the

4.2 Comparison of Experimental group means in Fitness Variables on Pre and Post Tests

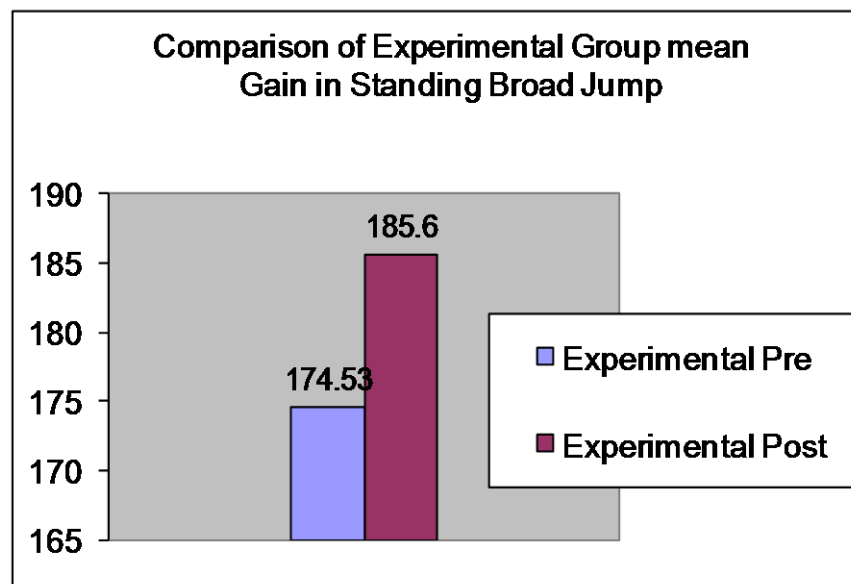
The mean performance scores of the subjects in the physical fitness variables of Experimental group have been presented in table 2. The same is also presented graphically below.



Comparison of Experimental group mean gains in Standing Broad Jump on Pre and Post Tests

In the case of **standing broad jump** test the mean performance of experimental group in the pre and post tests, were **174.53 (SD = 14.36)** and

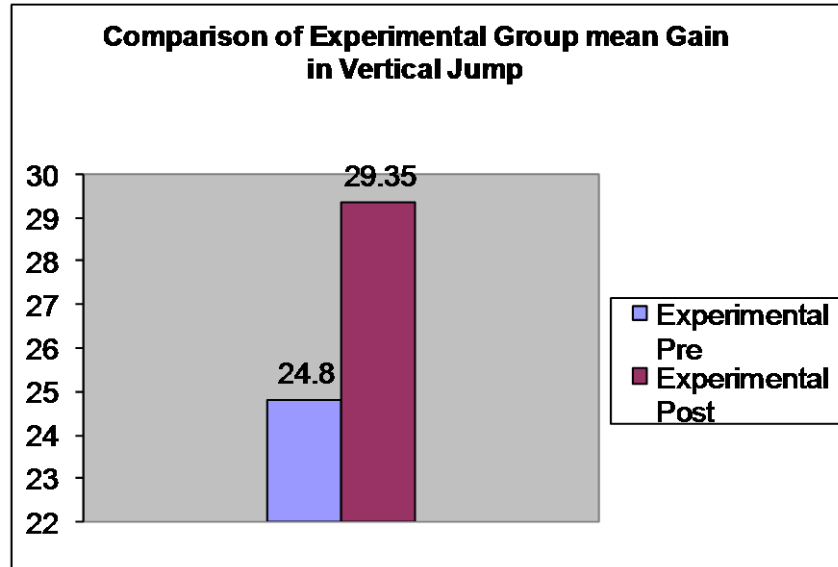
185.60 (SD = 14.37) respectively. The mean gain for experimental group was **11.60 (SE_M = 3.79)**. The result of 't'-test of the experimental group show significant improvement in Standing Board Jump test ($t = 3.06, p < 0.05$).



Comparison of Experimental group mean gains in Vertical Jump on Pre and Post Tests

4.2.4 Comparison of Experimental group means gains in Vertical Jump on Pre and Post Tests

In the case of **Vertical Jump** test the mean performance of experimental group in the pre and post tests, were **24.80 (SD = 4.25)** and **29.35 (SD = 3.64)** respectively. The mean gain for experimental group was **4.55 (SE_M = 0.83)**. The result of 't'-test of the experimental group show significant improvement in **Vertical Jump** test (**t = 5.48, p <0.01**).



4.3 Mean gains on pre-test of Control Vs Experimental Groups

Mean gains on pre-test of Control Vs Experimental Groups of physical fitness variables have been presented in Table 3. The same is also presented graphically below.

CHAPTER V

TABLE 3

**GROUP MEAN GAINS IN PRE TEST OF PHYSICAL FITNESS
VARIABLES OF CONTROL AND EXPERIMENTAL GROUPS**

VARIABLES	GROUPS	MEAN GAIN	DIFFERENCE	SEm	t'	Significance
Pull-Ups	Control	2.85	0.35	0.28	1.25	p>0.05
	Vs Experimental	3.2				
Sit-ups	Control	14.15	1.00	0.47	2.13	p<0.05
	Vs Experimental	15.15				
Standing Broad Jump	Control	174.75	0.75	3.84	0.19	p>0.05
	Vs Experimental	174.00				
Vertical Jump	Control	25.30	0.50	0.79	0.63	p>0.05
	Vs Experimental	24.80				

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The game of Volleyball is developing very fast these days. The game is very aggressive in nature, where the skill to be performed should be more relational and accurate. The motor fitness components which should be developed among the Volleyball players are strength, flexibility, endurance, power and agility etc. which could determine the performance in the game of Volleyball.

A systematic strength training programme perhaps very much useful in almost every sport. Skill like smashing in Volleyball requires much power and strength in the players. So strength training could be much more beneficial for all especially Volleyball players to deliver the skill more efficiently.

In the past decade strength training has become so popular and inversely used that it has thrown off almost all the prejudice that once

surrounded it. Now strength is recognized as vital necessity for many sports, the easiest method of gaining all around bodily strength is by the use of sensible strength training.

Not only do people use strengthening for competitive weight lifting and body building, but man sportsmen and women for increasing number every year use strength training to better their own performance. Certain sports clearly prefer strength training but there is still a gap in rendering proper training due to lack of professionally qualified people. This problem can be solved with the science of strength training.

The discussion above and statement of research reports as presented in the review of literature have revealed that strength training has become an imminent training method for improving any sports performance. It has become clear that strength training is not only useful for the weightlifters, but also useful among different players including Volleyball. However it is not known today that strength training can be adopted at school aged volleyball players for skill development. It was, therefore, thought desirable to conduct an experiment in this line.

Training Programme for the Promotion of Fitness Skill Ability of Volleyball Player Boys Aged 14 years” has been undertaken.

H1: Strength training exercises would improve the overhead volley skills as measured by Over Head Volley Test.

H2: Strength training exercises would help to gain fore arm pass skill in Volleyball as measured by Bump to Self test.

H3: Strength training would improve the service ability in Volleyball as assessed by Service test.

H4: Strength training would improve the level of arm/shoulder strength as assessed by Pull Ups test.

H5: Programme of Strength training would improve ability in Abdominal strength and endurance as measured by Sit Ups test.

H6: Strength training would improve explosive power as measured by Standing Broad Jump test.

H7: Strength training would improve ability of Anaerobic power as measured by Vertical Jump test.

The present investigation has a large scope. To meet all the areas of the scope is not possible within a short period allowed to us. The researcher, therefore, thought do delimit this study for its easy completion.

- The study was conducted on the players aged 14 years.
- The study was delimited to certain selected strength training exercises as training intervention.
- The total period of experiment was only for the six weeks.
- The study was conducted on certain selected Volleyball skills.
- This is also limited to certain physical variables.

The researcher recorded some shortcomings or faults while conducting the actual experiment are as follows:

5.2 Conclusions

Within certain limitations the present experiment warrants the following conclusions:

- The strength training exercises imparted in this study for a period of 6 weeks was useful in improving the over all Volleyball skills as included for experiment.
- Associated motor fitness variables of Volleyball players were also improved significantly as a result of selected strength training exercises.

5.3 Recommendations

The following recommendations were made in the light of this investigation for further research:

- There is a need of study the effect of other strength training exercises for the promotion of physical fitness in other sports events.
- The subjects were neither professional Volleyball players nor they had learnt this game under specific coaching earlier; therefore, further study is essential on trained players along with the well planned programme of specific strength training exercises with an increase in the training period.
- The subjects selected for this study were boys; hence a similar study could be conducted on girls.
- The present study recommends the use of these finding to sports coaches, physical education teachers and sports scientists for training and assisting in preparing students for competitions.
- More innovative strength training programmes may be developed for various other sports competitions.

APPENDIX I

Control Group Pull Ups Test Score

Code	Pre-Test	Post-Test
1	1	2
2	0	2
3	3	3
4	3	4
5	3	2
6	3	5
7	4	4
8	3	2
9	5	4
10	2	3
11	1	2
12	3	2
13	2	2
14	6	4
15	5	6
16	4	5
17	1	2
18	3	4
19	4	3
20	1	2

APPENDIX II

Control Group Sit Ups Test Score

Code	Pre-Test	Post-Test
1	15	16
2	16	16
3	18	15
4	14	16
5	13	15
6	16	14
7	17	13
8	15	18
9	14	13
10	12	17
11	10	13
12	15	16
13	17	15
14	13	14
15	10	15
16	12	10
17	14	14
18	16	17
19	13	15
20	13	13

APPENDIX III

Control Group Standing Broad Jump Test Score

Code	Pre-Test	Post-Test
1	163	121
2	150	162
3	171	161
4	169	179
5	153	158
6	183	189
7	187	185
8	169	173
9	192	199
10	194	201
11	181	191
12	195	199
13	192	205
14	183	197
15	185	178
16	169	173
17	157	155
18	163	179
19	181	192
20	158	167

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Biodiversity study of Satpuda National Park, Madhai, Dist. Hoshangabad, Madhya Pradesh.

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Abstract:

Introduction: Satpura National Park is located in district Hoshangabad of Madhya Pradesh in India. It gets the name from Satpura hill ranges (Mahadeo hills). The national park is not very far from the borders of Maharashtra.

It is spread over an area of 524 km². Satpura National Park along with the adjoining Bori and Panchmarhi Sanctuaries, provides 1427 km² of unique Central Indian Highland ecosystem. It was set up mainly for the conservation of Tigers hence also called as 'Satpura Tiger Reserve'.

Satpura Tiger Reserve spreads through the dense woody forest of evergreen sal, teak and bamboo. This reserve is extremely rocky and it is bestowed with sandstone peaks, narrow gorges, and ravines, an ideal habitat for the big cats viz. tigers and leopards. Satpura National Park is very rich in biodiversity and it houses some of the rare species of the animal kingdom and a large variety of birds.

The terrain of the national park is extremely rugged and consists of fascinating deep valleys, sandstone peaks, narrow gorges, rivulets, waterfalls, thickly dense green forest of Sal and other medicinal herbs and Tawa vast reservoir. Un-even altitude ranges from 290m. to 1352 m. Highest peak of national park is in Satpura National Park i.e. Dhoopgarh at an altitude of 4500 feet (1400 m.). As it is the highest peak of Madhya Pradesh, sunlight reaches this peak earlier than any other landscape of Madhya Pradesh.

Department of Zoology B.N Bandodkar College Thane, has been going to the Satpura National Park in January every year since 2010 for their excursion. The ecosystem has been observed for the past 3 years and certain observations are made.

Method: Being a tiger reserve ,trails are not allowed in the forests. Hence, observations and identification was done only while moving on the terrain in a gypsy. The flora and fauna were visually estimated and whenever necessary, by using binoculars of 10 x 50.

Observations:

TABLE 1: FLORA

Sr. No.	Scientific Name	Common Name	Habit
1	<i>Tectona grandis</i>	Teak	Trees
2	<i>Shorea robusta</i>	Sal	Trees
3	<i>Sweitenia mahogany</i>	Mahogany	Trees
4	<i>Pinus roxburgii</i>	Pine	Trees
5	<i>Pongamia pinnata</i>	Karanj	Trees
6	<i>Azadirachta indica</i>	Neem	Trees
7	<i>Chloroxylon sps</i>	--	Trees
8	<i>Boswellia serrata</i>	Sarai	Trees
9	<i>Zizyphus jujuba</i>	Bor	Trees
10	<i>Embelia officinalis</i>	Amla	Trees
11	<i>Mallotus philippinensis</i>	Kapila*	Tree
12	<i>Grewelia robusta</i>	Silver oak	Tree
13	<i>Aegle marmelos</i>	Bael	Tree
14	<i>Ferromia elephantum</i>	Kavat	Tree
15	<i>Acacia auriculiformis</i>	Australian babool	Tree
16	<i>Acacia arabica</i>	Babool*	Tree
17	<i>Terminalia arjuna</i>	Arjuna	Tree
18	<i>Terminalia tomentosa</i>	Ain	Tree
19	<i>Sweitenia macrophylla</i>	Honduras mahogany	Tree
20	<i>Ficus benghalensis</i>	Banyan	Tree
21	<i>Ficus religiosa</i>	Peepal	Tree
22	<i>Anogeissus latifolia</i>	Dhavda	Tree
23	<i>Buchnanian lanzun</i>	Charoli	Tree
24	<i>Phoenix sylvestris</i>	Shindi	Tree
25	<i>Madhuca indica</i>	Mahua	Tree
26	<i>Blepharis madraspattana</i>	--	Herb
27	<i>Glycosmis pentaphylla</i>	--	Shrub
28	<i>Opuntia sps</i>	Nivdung*	Shrub
29	<i>Strobilanthes sps</i>	--	Shrub
30	<i>Euphorbia squarosum</i>	--	Shrub
31	<i>Clematis sps</i>	--	Climber
32	<i>Acacia pinnata</i>	--	Climber
33	<i>Loranthus longiflorus</i>	--	Semi parasite
34	<i>Bambusa sps</i>	Bamboo	Grass

35	<i>Drosera burmani</i>	Sun dew plant	Insectivorous plant
36	<i>Sterculia urens</i>	Ghost tree	Tree
37	<i>Eucalyptus globulous</i>	Nil giri	Tree

At Satpuda National Park the forest type is mainly semi deciduous with an astounding Bio-diversity including over 1300 species of plants. There was immense floral diversity .Due to the dense forest cover all the plants could not be identified. However, 36 types of trees were identified and studied, as we could move only in jeeps. The study showed dominance of trees like Teak and Sal followed by 4 types of shrubs and solitary species of semi parasitic, insectivorous plants and grasses.

AQUATIC BIRDS



Painted stork



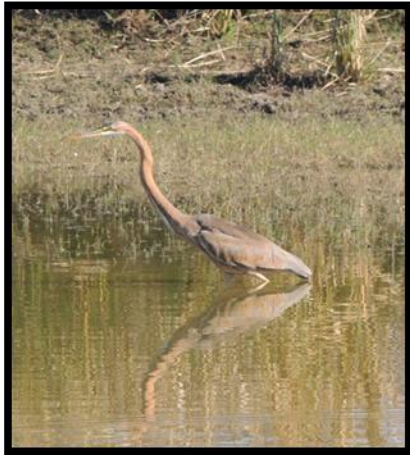
pen billed stork



Wooly necked stork



Grey necked stork



Purple heron



Bar headed geese

FLORA AND FAUNA



Plum headed Parakeet



Wild Boar



Gaur



Teak



Muggar Crocodile

Photographs by : Dr Mrs Poonam N. Kurve and Mr. Dilip D. Shenai.

FAUNA:

The fauna observed were predominantly mammalian and avian. The mammals sighted in the area included the grazers like herds of gaur, sambar and spotted deer along with the solitary black buck female. The monkeys like the Rhesus Macaque and the Hanuman Langurs were the companions of the safari throughout. Rhesus Macaque were more in number than the hanuman langurs. The Malabar giant squirrel and jackal were also sighted. Herds of wild boars consisting of males, females and piglets were feeding at various places of the national park. It has been mentioned that a few of the big cats like the tigers and the leopards are present in the national park (www.google.com) but none were sighted during the last 3 visits however the pug marks of a tigress and a leopard were spotted at many parts along the route of the safari thereby confirming their presence in the park. The droppings of a porcupine were also keenly observed to try and track its presence nearby as the droppings were fresh.

Comparatively lower temperatures were experienced in the region than the previous 2 years. The temperatures in Panchmarhi and Madhai were approximately 4-6°C. Diverse species of birds were noticed. Among them flocks of red vented bulbuls and blossom headed parakeets were most dominant. On the whole 50 species of birds were observed at various junctures of the Satpura national park. Yellow footed green pigeon the State bird of Maharashtra was a common resident of many of the trees there. Malabar pied hornbill, an endangered species also made its presence felt. Diversity of aquatic birds could be seen in the areas surrounding the Denva rivers and other small pockets of water in the National Park.

Malabar whistling thrush a bird sighted at high altitude. This bird charmed everyone.

Among reptiles crocodiles and a snake was seen. However the snake could not be identified.

Table 2: List of mammals sighted at Madhai forest.

Sr. No.	Scientific Name	Common Name
1	<i>Antelope cervicapra</i>	Black Buck
2	<i>Bos gaurus</i>	Gaur (Indian Bison)
3	<i>Melursus ursinus</i>	Sloth Bear
4	<i>Sus scrofa</i>	Indian Wild Boar
5	<i>Axis axis</i>	Spotted Deer (Cheetal)
6	<i>Cervus unicolor</i>	Sambar
7	<i>Ratufa indica</i>	Malabar Giant Squirrel
8	<i>Funambulus palmarum</i>	Three Stripped Palm Squirrel
9	<i>Herpestes edwardsil</i>	Common Mongoose
10	<i>Macaca mulatta</i>	Rhesus Macaque
11	<i>Semnopithecus entellus</i>	Hanuman Langurs
12	<i>Canis aureus</i>	Golden Jackal
13	<i>Boselaphus tragocamelus</i>	Blue Bull (Nilgai)

Table 3: List of Birds sighted at Madai

Sr. No.	Scientific name	Common name
1.	<i>Coracias benghalensis</i>	Indian Roller
2.	<i>Halcyon smyrnensis</i>	White throated Kingfisher
3.	<i>3Turdoides striata</i>	Jungle Babbler
4.	<i>Pavo cristatus</i>	Pea cock
5.	<i>Accipiter badius</i>	Shikra
6.	<i>Psittacula eupatria</i>	Alexandrin parakeet
7.	<i>Psittacula roseate</i>	Blossom headed parakeet
8.	<i>Dinopium benghalense</i>	Flame back Woodpecker
9.	<i>Corvus culminatus</i>	Jungle crow
10.	<i>Pycnonotus cafer</i>	Red vented bulbul
11.	<i>Leptocoma zeylonica</i>	Purple sunbird
12.	<i>Gallus sonneratii</i>	Jungle fowl

13.	<i>Spilornis cheela</i>	Crested Serpent eagle
14.	<i>Athene brama</i>	Spotted owl
15.	<i>Treron phoenicoptera</i>	Yellow footed green pigeon
16.	<i>Chloropsis aurifrons</i>	Chloropsis
17.	<i>Ceryle rudis</i>	Pied kingfisher
18.	<i>Treron phoenicoptera</i>	Green pigeon
19.	<i>Dendrocitta vagabunda</i>	Rufous tree pie
20.	<i>Pericrocotus flammeus</i>	Scarlet minivet
21.	<i>Anthracoceros coronatus</i>	Malabar pied hornbill
22.	<i>Dicrurus caerulescens</i>	White bellied drongo
23.	<i>Dicrurus remifer</i>	Racket tailed drongo
24.	<i>Dicrurus macrocercus</i>	Common drongo
25.	<i>Myophonus horsfieldii</i>	Malabar whistling thrush
26.	<i>Acridotheres fuscus</i>	Jungle myna
27.	<i>Merops orientalis</i>	Green bee eater
28.	<i>Ocyrceros birostris</i>	Grey hornbill
29.	<i>Upupa epops</i>	Hoopoe
30.	<i>Phoenicurus ochruros</i>	Black red start
31.	<i>Anthus rubescens</i>	Pipit
32.	<i>Coturnix coturnix</i>	Quail
33.	<i>Ardea alba</i>	Large egret
34.	<i>Vanellus indicus</i>	Red wattled lapwing
35.	<i>Mycteria leucocephala</i>	Painted stork
36.	<i>Nycticorax nycticorax</i>	Night heron
37.	<i>Sterna aurantia</i>	River tern
38.	<i>Anser indicus</i>	Bar headed goose
39.	<i>Tadorna ferruginea</i>	Ruddy shelduck
40.	<i>Vanellus duvaucelii</i>	River lapwing
41.	<i>Anastomus oscitans</i>	Open billed stork
42.	<i>Pseudibis papillosa</i>	Black ibis
43.	<i>Ciconia episcopus</i>	Wooly necked stork
44.	<i>Himantopus himantopus</i>	Black winged stilt
45.	<i>Sarkidiornis melanotos</i>	Comb duck
46.	<i>Phalacrocorax pygmaeus</i>	Large cormorant
47.	<i>Ardeola grayii</i>	Indian Pond heron
48.	<i>Ardea cinerea</i>	Grey heron
49.	<i>Ardea purpurea</i>	Purple heron
50.	<i>Ficedula albicilla</i>	Red throated flycatcher

CONCLUSION:

- The bio diversity of the terrain was studied to inculcate interest among students.
- The temperature was low, as low as 3°C at night.
- The forest was dense.
- The peaks and cliff side were specially of sand stone. As a result the streams continue to flow throughout the year.

- Dominant trees were Teak, Sal, Neem, Nil giri, Bamboos, Banyan, Peepal and various cacti. Clematis spp. a climber was seen in fruiting stage throughout the forest cover.
- Waders were sighted near water bodies. Some were residential King Fisher, Purple heron, Black winged stilts, etc. While some were migratory for example Painted stork, Woolly necked Stork, Open Bill Stork, Black Ibis, Bar headed Geese, Ruddy Shel Duck, River lap wing, etc.
- Malabar Pied Horn Bill an endangered bird species was sighted.
- Green pigeon the state bird was also sighted in large numbers.
- The endangered mammal species the flying squirrel was also sighted.

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HUMAN INTERFERON

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IFNs belong to the large class of glycoproteins known as cytokines. Interferons are named after their ability to "interfere" with viral replication within host cells. Isaacs and Linden Mann first discovered the molecule in 1957[1]. IFNs have other functions: they activate immune cells, such as natural killer cells and macrophages; they increase recognition of infection or tumour cells by up-regulating antigen presentation to T lymphocytes; and they increase the ability of uninfected host cells to resist new infection by virus. Certain symptoms, such as aching muscles and fever, are related to the production of IFNs during infection.

About ten distinct IFNs have been identified in mammals; seven of these have been described for humans. They are typically divided among three IFN classes: Type I IFN, Type II IFN, and Type III IFN. IFNs belonging to all IFN classes are very important for fighting viral infections.

IFNs are a multigene family of inducible cytokines. They are commonly grouped into two types.

Type I IFNs are also known as **viral IFNs** and include IFN- α (leukocyte), IFN- β , (fibroblast) and IFN- ω . **Type II** IFN is also known as **immune IFN (IFN- γ)**. The viral IFNs are induced by virus infection, whereas type II IFN is induced by mitogenic or antigenic stimuli. Most types of virally infected cells are capable of synthesizing IFN- α/β in cell culture. IFN- γ is synthesized only by certain cells of the immune system including natural killer (NK) cells, CD4 Th1 cells, and CD8 cytotoxic suppressor cells. The natural IFN- α -producing cells appear to be precursor dendritic cells.[2,3,4]

Based on the type of receptor through which they signal, human interferons have been classified into three major types.

Interferon type I: All type I IFNs bind to a specific cell surface receptor complex known as the IFN- α receptor (IFNAR) that is composed of two identified subunits- IFNAR1 and IFNAR2 chains.[2] The type I interferons present in humans are IFN- α , IFN- β and IFN- ω .[3] They exhibit a variety of biological functions, including antiviral, antiproliferative, immunomodulatory and developmental activities. The interaction of IFN-alpha/beta with its receptor components results in the activation of a number of signaling pathways. The regulation of specific genes and proteins contributes to the numerous biological functions of Type I IFNs.[9]

Interferon type II: Binds to IFNGR that consists of IFNGR1 and IFNGR2 chains. In humans this is IFN- γ . IFN- γ plays key roles in both the innate and adaptive immune response. IFN- γ activates the cytotoxic activity of innate immune cells such as macrophages and NK cells (5,6). IFN- γ production by NK cells and antigen-presenting cells (APCs) promotes the cell mediated adaptive immunity by inducing IFN- γ production by T lymphocytes, increased class I and class II MHC expression, and enhancing peptide antigen presentation (5). The anti-viral activity of IFN- γ is due to its induction of PKR and other regulatory proteins. Binding of IFN- γ to the IFNGR1/IFNGR2 complex promotes dimerization of the receptor complexes to form (IFNGR1/IFNGR2)₂ -IFN- γ dimer. Binding induces a conformational change in receptor intracellular domains and signaling involves Jak1, Jak2 and Stat1 (7). The critical role of IFN- γ in amplification of immune surveillance and function is supported by increased susceptibility to pathogen infection by IFN- γ or IFNGR knockout mice and in humans with inactivating mutations in

IFNGR1 or IFNGR2. IFN- γ also appears to have a role in atherosclerosis (8). Recombinant hIFN- γ has a Met on the amino terminus and has a calculated MW of 16,907. DTT-reduced and non-reduced protein migrate as 17 kDa polypeptides. The expected amino-terminus MQDPY of recombinant hIFN- γ was verified by amino acid sequencing

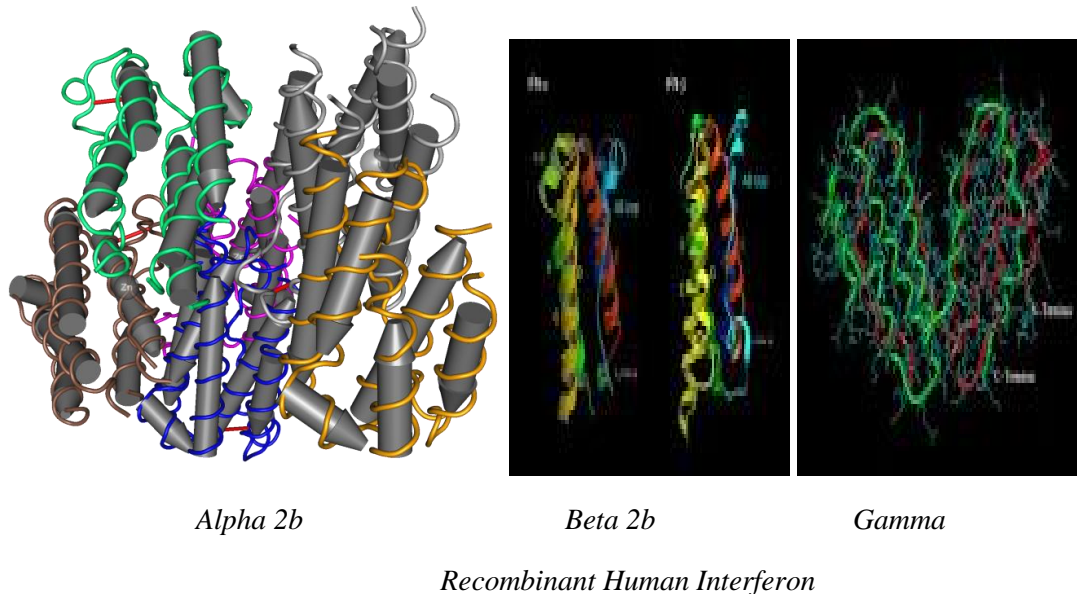
Interferon type III: Signal through a receptor complex consisting of IL10R2 (also called CRF2-4) and IFNLR1 (also called CRF2-12). Acceptance of this classification is less universal than that of type I and type II, and unlike the other two[10].

Table 1 Pharmaceutical form of interferon

Generic name	Trade name
Interferon alpha 2a	Roferon A
Interferon alpha 2b	Intron A/Reliferon/Uniferon
Human leukocyte Interferon-alpha (HuIFN-alpha-Le)	Multiferon
Interferon beta 1a, liquid form	Rebif
Interferon beta 1a, lyophilized	Avonex
Interferon beta 1a, biogeneric (Iran)	Cinnovex
Interferon beta 1b	Betaseron / Betaferon
Interferon beta 1b, biosimilar (Iran)	Ziferon
PEGylated interferon alpha 2a	Pegasys
PEGylated interferon alpha 2a (Egypt)	Reiferon Retard
PEGylated interferon alpha 2b	PegIntron
PEGylated interferon alpha 2b plus ribavirin	Pegetron

Table 2 Human interferon

IFNA1	Antiviral activity
IFNA2	Reduction of symptoms and duration of common cold
IFNA4	Antiviral activity, stimulates the production of a protein kinase and an oligoadenylate synthetase, participates in Jak-Stat signaling pathway.
IFNA5	Stimulates the production of a protein kinase and an oligoadenylate synthetase
IFNA6	Stimulates the production of a protein kinase and an oligoadenylate synthetase
IFNA7	Stimulates the production of a protein kinase and an oligoadenylate synthetase
IFNA8	Stimulates the production of a protein kinase and an oligoadenylate synthetase
IFNA10	Allows communication between cells to trigger the protective defenses of the immune system
IFNA13	Antiviral and antiproliferative effects, treatment of malignant diseases, and act protectively against the radiation. Alter the activity of thermosensitive neurons in the hypothalamus.
IFNA14	Regulator of growth and differentiation affects cellular communication and signal transduction pathways as well as immunological control, prototypic tumor suppressor protein.
IFNA16	Increase recognition of infection or tumor cells by up-regulating antigen presentation to T lymphocytes; and they increase the ability of uninfected host cells to resist new infection by virus.
IFNA17	Act as chemosensitizer
IFNA21	Increase recognition of infection or tumor cells by up-regulating antigen presentation to T lymphocytes; and they increase the ability of uninfected host cells to resist new infection by virus.
IFNA ω	Stimulates natural killer cell activity, enhances expression of major histocompatibility complex class I (but not class II) antigens and inhibits proliferation of lymphocytes stimulated with mitogens or allogeneic cells.
IFNA ϵ 1	In reproduction and host defense
IFN κ	Imparts cellular protection against viral infection in a species-specific manner. Activates the interferon-stimulated response element signaling pathway. It is able to directly modulate cytokine release from monocytes and dendritic cells. Binds heparin.



Cell signaling:

Interferon in cell signalling: Interactions between integrins and the extracellular matrix mediate intracellular signaling mechanisms to regulate cell survival, differentiation, cell cycle progression, and inflammatory responses. We offer a broad range of gene-specific products for studying integrin cell signaling and signal transduction.

Integrin Cell Signalling: Interactions between integrins and the extracellular matrix mediate intracellular signaling mechanisms to regulate cell survival, differentiation, cell cycle progression, and inflammatory responses. We offer a broad range of gene-specific products for studying integrin cell signaling and signal transduction.

Inflammatory Response Pathway: A protective response of cells to infection, inflammation involves the coordinated communication among different immune cells through an intricate cascade of molecular signals.

Akt Cell Signaling: Currently, Akt and the Akt signaling pathway is one of the most actively studied kinases or kinase pathways in both the basic research and drug development arenas.

JAK-STAT Cell Signaling : The janus kinase (JAK)-signal transducer and activator of transcription (STAT) pathway plays a critical role in the signaling of a wide array of cytokines and growth factors leading to various cellular functions, including proliferation, growth, hematopoiesis, and immune response.

Mitogen Activated Protein Kinase (MAPK) Cell Signaling: The mitogen-activated protein kinase (MAPK) pathway mediates signal transduction from cell surface receptors to downstream transcription factors that lead to cellular responses such as cell proliferation, growth, motility, survival and apoptosis. The role of MAPK pathway in cancer, immune disorders and neurodegenerative diseases has been well recognized.

T-Cell Receptor (TCR) Cell Signaling The T-Cell Receptor (TCR) is a complex of integral membrane proteins that participates in the activation of T-Cells in response to the presentation of antigen. Stimulation of TCR is triggered by MHC (Major Histocompatibility Complex) molecules on Antigen

Presenting Cells that present antigen peptides to TCR complexes and induce a series of intracellular signaling cascades.

Tumor Necrosis Factor (TNF) :superfamily of cytokines represents a multifunctional group of proinflammatory cytokines which activate cell signaling pathways for cell survival, apoptosis, inflammatory responses, and cellular differentiation.

Toll-like Receptor (TLR) Cell Signaling:Toll-like receptor (TLR) signaling plays an essential role in the innate immune response. Activation of TLR signaling through recognition of pathogen-associated molecular patterns leads to the transcriptional activation of genes encoding for pro-inflammatory cytokines, chemokines and co-stimulatory molecules, which subsequently control the activation of antigen-specific adaptive immune response

Molecular weight of interferon:

Human IFN- α (MW \approx 16,000 to 27,000):- 1FN α -, (formerly immune IFN) is a product of activated lymphocytes. The molecular weight of the unglycosylated human IFN-7 polypeptide is **17.1K** .Most of these species have a signal peptide sequence of 23 amino acid residues and a mature amino acid sequence of 166 amino acid residues. The region between 139 to 151 is strongly conserved among the IFN- α species and IFN- β . Most of the IFN- α species have four-conserved cysteine at positions 1, 29, 98/99 and 138/139. The first residue of human IFN- α species is probably a cysteine as determined by reduction and alkylation studies (Allen and Fantes, 1980). The secondary structure of several IFN- α species molecules has a large α -helix content and essentially no β -sheet. It is postulated that the sugar moiety of IFN- α species is covalently linked to the protein by o-glycosylation. At least 23 different variants of IFN-alpha are known. The individual proteins have molecular masses between 19-26 kDa and consist of proteins with lengths of 156-166 and 172 amino acids. Many IFN-alpha subtypes differ in their sequences at only one or two positions. The disulfide bond 29/138 is essential for biological activity while the 1/98 bond can be reduced without affecting biological activity. In contrast to IFN-gamma, IFN-alpha proteins are stable at pH 2. The Mol. Wt. of human IFN- β is 20,027 and is made up of a mature protein of 166 amino acid residues and a signal peptide of 21 amino acids. Human IFN- β has three cysteines at positions 17,31, and 141. The α -helix content appears to be less than that of the IFN- α species (47%). IFN- β has been clearly demonstrated to be a glycoprotein (knight and Fahey, 1982). Glycosylation is not required for biological activity in vitro. The protein contains a disulfide bond Cys31/141 required for biological activity. IFN-beta, like IFN- alpha is stable at pH 2. In case of Human IFN- γ , the complete primary amino acid sequences are in two forms 25KD and 20KD. IFN- γ is made up of a signal peptide of 20 amino acid residues and a mature protein of 146 amino acid residues. The first residue of the N-terminus of IFN- γ is glutamic acid in the form of pyroglutamate. IFN-gamma is a dimeric protein with subunits of 146 amino acids. The pI is 8.3-8.5. Glycosylation is not required for biological activity. IFN-gamma contains two cysteine residues, which are not involved in disulfide bonding. There are at least six different variants of naturally occurring IFN-gamma. They differ from each other by variable lengths of the carboxyterminal ends. In contrast to IFN-alpha and IFN-beta, IFN-gamma is labile at pH 2. IFN-gamma does not display significant homology with the other two interferons, IFN-alpha and IFN-beta . Murine and human IFN-gamma show approximately 40 percent sequence homology at the protein level.

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PHYSIO-CHEMICAL PARAMETERS OF CREEK WATER BEFORE AND AFTER GANPATI VISARJAN.

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Introduction :

Water quality refers to chemical, physical & biological characteristics of water. It is the measure of the condition of the water relative to the requirements of one or more biotic species & to any human need or purpose. It is most frequently used by reference to a set of standards against which compliance can be assessed. The most common standards used to assess water quality relate to health of ecosystems, safety of human contact & drinking water.

The parameters of water quality are determined by the intended use. Work in the area of water quality tends to be focused on water that is treated for human consumption, industrial use or in the environment.

Dissolved Oxygen (D.O) , Total solids, Hardness, Chlorides,- Density etc these water parameters were determined before & after Ganpati visarjan (For 1 & ½ day, 5th, 7th & 10th day.)

Methodology:

Dissolved oxygen:-

The method used was winkler's azide modification titrimetric method . The sample were fixed on the field using manganese sulphate solution [winkler's A] and alkali iodized azide solution [winkler's B] The fixed samples were titrated against 0.0125N Na₂S₂O₃ after addition of sulphuric acid to dissolved the precipitate using starch as an indicator. The end point was blue to colourless.

Formula,

$$\text{Dissolved oxygen(mg/l)} = (N \cdot C.B.R. \cdot 8 \cdot 1000) / V_2(V_1 - V) / V$$

Where,

V=total amt of chemical added

V₁=total amt of water sample

V₂=amt of sample taken for titration

N=normality of Na₂S₂O₃

Total Solids:- The total solids were determined by evaporation method. The total solids were the residue left after evaporation of unfiltered sample .The total dissolved solids were determined as the total residue left after evaporation of filtered sample while total suspended solids were the difference between the values of total solids and total dissolved solids.

Formula,

(1)Total suspended solids(mg/l)=W2-W3*1000*1000/vol. of sample.

(2)Total dissolved solids(mg/l)=W2-W3*1000*1000/vol. of sample

(3)Total solids(mg/l)=total suspended solids+total dissolved solids.

Hardness :-

Hardness was estimated by Argentometric method.The titration of the sample was carried out against std. silver nitrate solution using Erichrome black-T as indicator where the end point was wine red to blue.

Formula, Hardness (mg/l) = (A*B)*N*1000 / vol. of sample

Where,A= burette reading in ml B=1 as 1 m

Chlorides: The method used was Argentometric method. The chloride ion was estimated by titration with std.AgNO3 using potassium chromate as the indicator. The end point was yellow to brick red.

Formula,

Chlorides (mg/l)=(A-B)*N*1000/vol. of sample

Where,

A=ml titration for sample;B= ml titration for blank; N= normality of AgNO3

Result –

Parameters	Before (mg/l)	After [Days]			
		1 & ½	5	7	10
D.O	0.42	0.33	0	0	0
Total Solids	7.6x10 ³	825	1105	1292	1412
Hardness	1200	1302	1355	1456	1600
Chlorinity	62.3	68	76.3	81.1	89.1
Density	7	8	10	10.5	11.2

Conclusion :

As per the results, readings of the parameters are increasing consistently due to the immersion of Ganesh idols. So, it needs to be treated further.

PHYTOREMEDIATION THROUGH WATER GARDENING

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Introduction

Phytoremediation describes the treatment of environmental problems [bioremediation] through the use of plants that mitigate the environmental problems without the need to excavate the contaminant material and disposed of it elsewhere.

Phytoremediation consist of mitigating pollutant concentration in contaminated soil, water or air with plants able to contain degrade or eliminate metals, pesticides, solvents, explosives, crude oil and its derivatives and various other contaminants from the media that contain them.

Types of phytoremediation are phytoextraction, phytostabilization, phytotransformation, phytostimulation, phytovolatilization, rhizofiltration. The method used for purification of water was rhizofiltration, rhizofiltration is the technique that contain filtering of water through a mass of roots to remove toxic substances or excess nutrients the pollutants remain reabsorbed in or absorbed to the roots.

The water was collected from the creek i.e sewage water and for comparison fresh tap water sample was also collected as the control. The changes were noted & the results were tabulated according to which conclusion was drawn.

Methodology

Dissolved oxygen:-

The method used was winkler's azide modification titrimetric method . The sample were fixed on the field using manganese sulphate solution [winkler's A] and alkali iodized azide solution [winkler's B] The fixed samples were titrated against 0.0125N Na₂S₂O₃ after addition of sulphuric acid to dissolved the precipitate using starch as an indicator. The end point was blue to colourless.

Formula,

$$\text{Dissolved oxygen(mg/l)} = (N * C.B.R. * 8 * 1000) / V_2(V_1 - V) / V$$

Where,

V=total amt of chemical added

V₁=total amt of water sample

V₂=amt of sample taken for titration

N=normality of $\text{Na}_2\text{S}_2\text{O}_3$

Total Solids:-

The total solids were determined by evaporation method. The total solids were the residue left after evaporation of unfiltered sample. The total dissolved solids were determined as the total residue left after evaporation of filtered sample while total suspended solids were the difference between the values of total solids and total dissolved solids.

Formula,

(1) Total suspended solids (mg/l) = $W_2 - W_3 \times 1000 / \text{vol. of sample}$.

(2) Total dissolved solids (mg/l) = $W_2 - W_3 \times 1000 / \text{vol. of sample}$

(3) Total solids (mg/l) = total suspended solids + total dissolved solids.

Hardness :-

Hardness was estimated by Argentometric method. The titration of the sample was carried out against std. silver nitrate solution using Erichrome black-T as indicator where the end point was wine red to blue.

Formula,

Hardness (mg/l) = $(A \times B) \times N \times 1000 / \text{vol. of sample}$

Where,

A = burette reading in ml

B = 1 as 1 ml, CaCO_3 of titrant

Chlorides:-

The method used was Argentometric method. The chloride ion was estimated by titration with std. AgNO_3 using potassium chromate as the indicator. The end point was yellow to brick red.

Formula,

Chlorides (mg/l) = $(A - B) \times N \times 1000 / \text{vol. of sample}$

Where,

A = ml titration for sample

B = ml titration for blank

N = normality of AgNO_3

PH:- The pH of samples are calculated by pH meter, pH paper and by using universal indicator.

Result:-

<u>Parameters</u>	<u>Before</u>		<u>After</u>	
	Tap water(mg/l)	Sewage water(mg/l)	Tap water (mg/l)	Sewage water(mg/l)
Dissolved oxygen	2.2	0	3.8	0.3
Chlorinity	2.4	56.8	2.1	42.4
TDS	0	7.4×10^3	4.2×10^3	3.3×10^3
TSS	0	4.96×10^5	4.1×10^4	4.43×10^4
Hardness	310	600	307	370

Conclusion: Phytoremediation method were studied by using water gardening technique. From the above result it can be seen that certain parameters in sewage water should be controlled which affects the growth of plants.

AZADIRACHTA INDICA: NATURES PRECIOUS GIFT

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Introduction:

Azadirachta indica (*Neem*) is one of two species in the genus *Azadirachta*, and is native to India, Pakistan, and Bangladesh growing in tropical and semi-tropical regions. Neem trees also grow in islands in the southern part of Iran where it is called "Cherishin Persian. Its fruits and seeds are the source of neem oil.

Neem is a fast-growing tree that can reach a height of 15–20 metres (49–66 ft), rarely to 35–40 metres (115–130 ft). It is evergreen, but in severe drought it may shed most or nearly all of its leaves. The branches are wide spread. The fairly dense crown is roundish or ovular and may reach the diameter of 15–20 metres (49–66 ft) in old, free-standing specimens.

Name in other languages

The English name *neem* is borrowed from Hindi; in English it is also known as **Indian Lilac**. The Urdu name is the same as that used in Nepali, Hindi, and Bengali . Other vernacular names include **Nimm** (Punjabi), **Vembu** (Tamil), **Arya Veppu** (Malayalam), **Azad Dirakht** (Persian), **Nimba**, **Arishta**, **Picumarda** (Sanskrit, Oriya), **Limdo** (Gujarati language) **Kadu-Limba** (Marathi), **Dongoyaro** (in some Nigerian languages), **Margosa**, **Neem** (ﻧﯩﻢ) (Arabic), **Nimtree**, **Vepu** , **Vempu** , **Vepa** (Telugu), **Bevu**(Kannada), **Kodu nimb** (Konkani), (Kohomba, Sinhala), **Tamar** (Burmese), **sàu đâu**, **xoan Ân Đô** (Vietnamese), (**Sdao**, Khmer), (**Sadao**, Thai), (Hebrew), "Maliyirinin" (Bambara language) and **Paraiso** (Spanish). In East Africa it is also known as **Muarubaini** (Swahili).

Leaves

The opposite, pinnate leaves are 20–40 centimeters (7.9–16 in) long, with 20 to 31 medium to dark green leaflets about 3–8 centimeters (1.2–3.1 in) long. The terminal leaflet is often missing. The petioles are short. The leaves are also used in to give baths to children suffering from skin diseases. The leaves are used in this manner that first they are washed thoroughly. Then 5-10 leaves along with the branch are boiled till the water turns green the water is then used for varying purposes. Elders find it useful in controlling high blood sugar level and is said to clean up the blood. Neem is also used to give baths to the Muslim dead. Neem leaves are dried in Pakistan and placed in cupboards to prevent insects eating the clothes. Neem leaves are dried and burnt in the tropical regions to keep away mosquitoes. These leaves are also used in many Indian festivals (by making them into garlands).

Flowers

The (white and fragrant) flowers are arranged axillary, normally in more-or-less drooping panicles which are up to 25 centimetres (9.8 in) long. The inflorescences, which branch up to the third degree, bear from 150 to 250 flowers. An individual flower is 5–6 millimetres (0.20–0.24 in) long and 8–11 millimetres (0.31–0.43 in) wide. Protandrous, bisexual flowers and male flowers exist on the same individual. Its leaf is approximately 5 to 10 cm. long



Fruit

The fruit is a smooth (glabrous) olive-like drupe which varies in shape from elongate oval to nearly roundish, and when ripe are 1.4–2.8 centimeters (0.55–1.1 in) by 1.0–1.5 centimetres (0.39–0.59 in). The fruit skin (exocarp) is thin and the bitter-sweet pulp (mesocarp) is yellowish-white and very fibrous. The mesocarp is 0.3–0.5 centimeter (0.12–0.20 in) thick. The white, hard inner shell (endocarp) of the fruit encloses one, rarely two or three, elongated seeds (kernels) having a brown seed coat.



The neem tree is very similar in appearance to its relative, the Chinaberry (*Melia azedarach*). The Chinaberry tree is toxic to most animals, especially to fish, but birds are known to gorge themselves on the Chinaberries, the seeds passing harmlessly through their unique digestive systems.

Ecology

The neem tree is noted for its drought resistance. Normally it thrives in areas with sub-arid to sub-humid conditions, with annual rainfall 400–1,200 millimetres (16–47 in). It can grow in regions with an annual rainfall below 400 mm, but in such cases it depends largely on ground water levels. Neem can grow in many different types of soil, but it thrives best on well drained deep and sandy soils. It is a typical tropical to subtropical tree and exists at annual mean temperatures between 21–32 °C (70–90 °F). It can tolerate high to very high temperatures and does not tolerate temperature below 4 °C (39 °F). Neem is a life-giving tree, especially for the dry coastal, southern districts of India and Pakistan. It is one of the very few shade-giving trees that thrive in the drought-prone areas. The trees are not at all delicate about the water quality and thrive on the merest trickle of water, whatever the quality. In India and tropical countries where the Indian diaspora has reached, it is very common to see neem trees used for shade lining the streets, around temples, schools & other such public buildings or in most people's back yards. In many countries such as Ecuador, Haiti and Venezuela the shade is the principal benefit so far commonly attributed to the neem. In very dry areas the trees are planted in large tracts of land.

Weed status

Neem is considered a weed in many areas, including some parts of the Middle East, and most of Sub-Saharan Africa including West Africa where in Senegal it has been used as a malarial drug and Tanzania

and other Indian Ocean states where in Kiswahili it is known as 'the panacea', literally 'the tree that cures forty [diseases]', where ayurvedic uses are practiced.

Ecologically, it survives well in similar environments to its own, for example replacing the babul acacia tree from India with African acacia species.

Applications:

As a vegetable

The tender shoots and flowers of the neem tree are eaten as a vegetable in India. A souplike dish called *Veppampoo Rasam* (Tamil) (translated as "neem flower rasam") made of the flower of neem is prepared in Tamil Nadu. In West Bengal, young neem leaves are fried in oil with tiny pieces of eggplant (brinjal). The dish is called *nim begun* and is the first item during a Bengali meal that acts as an appetizer.^[1] It is eaten with rice.

Neem is used in parts of mainland Southeast Asia, particularly in Cambodia, Laos (where it is called *kadao*), Thailand (where it is known as *sadao* or *sdao*), Myanmar (where it is known as *tamar*) and Vietnam (where it is known as *s?u d?au* and is used to cook the salad *g?i s?u d?au*). Even lightly cooked, the flavour is quite bitter and the food is not enjoyed by all inhabitants of these nations, though it is believed to be good for one's health. Neem gum is a rich source of protein. In Myanmar, young neem leaves and flower buds are boiled with tamarind fruit to soften its bitterness and eaten as a vegetable. Pickled neem leaves are also eaten with tomato and fish paste sauce in Myanmar.

Traditional medicinal use

In India, the plant is variously known as "Sacred Tree," "Heal All," "Nature's Drugstore," "Village Pharmacy" and "Panacea for all diseases". Products made from neem trees have been used in India for over two millennia for their medicinal properties: neem products are believed to be anthelmintic, antifungal, antidiabetic, antibacterial, antiviral, contraceptive and sedative.^{[2][unreliable source?]} It is considered a major component in Ayurvedic and Unani medicine and is particularly prescribed for skin disease.^[3]

Safety issues

There have been reports that Neem oil can cause some form of toxic encephalopathy and ophthalmopathy if consumed in large quantities.^[4]

Pest and disease control

Neem is a key ingredient in non-pesticidal management (NPM), providing a natural alternative to synthetic pesticides. Neem seeds are ground into a powder that is soaked overnight in water and sprayed onto the crop. To be effective, it is necessary to apply repeatedly, at least every ten days. Neem does not directly kill insects on the crop. It acts as an anti-feedant, repellent, and egg-laying deterrent, protecting the crop from damage. The insects starve and die within a few days. Neem also suppresses the hatching of pest insects from their eggs. Neem cake is often sold as a fertilizer.^[5]

Other uses

- **Neem oil** is used for preparing cosmetics such as soap, neem shampoo, balms and creams as well as toothpaste.
- Besides its use in traditional Indian medicine, the neem tree is of great importance for its anti-desertification properties and possibly as a good carbon dioxide sink.^[citation needed]
- Practitioners of traditional Indian medicine recommend that patients with chicken pox sleep on neem leaves.^[citation needed]
- **Neem gum** is used as a bulking agent and for the preparation of special purpose food.
- Traditionally, slender neem branches have been chewed to clean one's teeth. Neem twigs are still collected and sold in markets for this use, and in rural India one often sees youngsters in the streets chewing on neem twigs.
- Neem blossoms are used in Andhra Pradesh, Tamil Nadu and Karnataka to prepare Ugadi pachhadi. "*Bevina hoovina gojju*" (a type of curry prepared with neem blossoms) is common in Karnataka throughout the year. Dried blossoms are used when fresh blossoms are not available. In Tamil Nadu, a rasam (veppam poo rasam) made with neem blossoms is a culinary specialty.
- A mixture of neem flowers and bella (jaggery or unrefined brown sugar) is prepared and offered to friends and relatives, symbolic of sweet and bitter events in the upcoming new year.
- **Cosmetics** : Neem is perceived in India as a beauty aid. Powdered leaves are a major component of at least one widely used facial cream. Purified neem oil is also used in nail polish & other cosmetics.
- **Bird repellent**: Neem leaf boiled water can be used as a very cost effective bird repellent measure, especially for sparrow.
- **Lubricants** : Neem oil is non drying and it resists degradation better than most vegetable oils. In rural India, it is commonly used to grease cart wheels.
- **Fertilizers** : Neem has demonstrated considerable potential as a fertilizer. Neem cake is widely used to fertilize cash crops particularly sugarcane & vegetables. Ploughed into the soil, it protects plant roots from nematodes & white ants, probably due to its contents of the residual limonoids. In Karnataka, people grow the tree mainly for its green leaves & twigs, which they puddle into flooded rice fields before the rice seedlings are transplanted.
- **Resin** : An exudate can be tapped from the trunk by wounding the bark. This high protein material is not a substitute for polysaccharide gum, such as gum arabic. It may however, have a potential as a food additive, and it is widely used in South Asia as "Neem glue".
- **Bark** : Neem bark contains 14% tannin, an amount similar to that in conventional tannin yielding trees (such as *Acacia decurrens*). Moreover, it yields a strong, coarse fibre commonly woven into ropes in the villages of India.
- **Honey** : In parts of Asia neem honey commands premium prices & people promote apiculture / apiary by planting neem trees.
- **Soap** : India's supply of neem oil is now used mostly by soap manufacturers. Although much of it goes to small scale speciality soaps, large scale producers also use it, mainly because it is cheap. Generally, the crude oil is used to produce coarse laundry soaps.

Association with Hindu festivals in India

Neem leaf or bark is considered an effective pitta pacifier due to its bitter taste. Hence, it is traditionally recommended during early summer in Ayurveda (that is, the month of Chaitra as per the Hindu Calendar which usually falls in the month of March – April).

In the Indian states of Andhra Pradesh and Karnataka, Neem flowers are very popular for their use in 'Ugadi Pachhadi' (soup-like pickle), which is made on Ugadi day.

During Gudi Padva, which is the New Year in the state of Maharashtra, the ancient practice of drinking a small quantity of neem juice or paste on that day, before starting festivities, is found. As in many Hindu festivals and their association with some food to avoid negative side-effects of the season or change of seasons, neem juice is associated with Gudi Padva to remind people to use it during that particular month or season to pacify summer pitta.

In Tamilnadu during the summer months of April to June, the Mariamman temple festival is a thousand year old tradition. The Neem leaves and flowers are the most important part of the Mariamman festival. The goddess Mariamman statue will be garlanded with Neem leaves and flowers. During most occasions of celebrations and weddings the people of Tamilnadu adorn their surroundings with the Neem leaves and flowers as a form of decoration and also to ward off evil spirits and infections.

In the eastern coastal state of Orissa the famous Jagannath temple idols are made up of Neem heart wood along with some other essential oils and powders.

Chemical compounds

Salimuzzaman Siddiqui was the first scientist to bring the anthelmintic, antifungal, antibacterial, and antiviral constituents of the Neem tree to the attention of natural products chemists. In 1942, he extracted three bitter compounds from neem oil, which he named as nimbin, nimbinin, and nimbidin respectively.^[6] The process involved extracting the water insoluble components with ether, petrol ether, ethyl acetate and dilute alcohol. The provisional naming was *nimbin* (sulphur-free crystalline product with melting point at 205 °C, empirical composition C₇H₁₀O₂), *nimbinin* (with similar principle, melting at 192 °C), and *nimbidin* (cream-coloured containing amorphous sulphur, melting at 90–100 °C). Siddiqui identified *nimbidin* as the main active anti-bacterial ingredient, and the highest yielding bitter component in the neem oil.^[7] These compounds are stable and found in substantial quantities in the Neem. They also serve as natural insecticides.^[8]

Genome and Transcriptomes

Neem genome and transcriptomes from various organs have been sequenced, analyzed and published by Ganit Labs in Bangalore, India.^{[9] [10]}

Patent controversy

In 1995, the European Patent Office (EPO) granted a patent on an anti-fungal product derived from neem to the US Department of Agriculture and W. R. Grace and Company.^[11] The Indian government challenged the patent when it was granted, claiming that the process for which the patent had been granted had actually been in use in India for over 2,000 years. In 2000, the EPO ruled in India's favour but W. R. Grace appealed, claiming that prior art about the product had never been published in a scientific journal. On 8 March 2005, that appeal was lost and the EPO revoked the Neem patent.^[11]

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NEEM OIL

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Neem oil is a vegetable oil pressed from the fruits and seeds of the neem (*Azadirachta indica*), an evergreen tree which is endemic to the Indian subcontinent and has been introduced to many other areas in the tropics. It is the most important of the commercially available products of neem for organic farming and medicines.

Neem oil is generally red as blood, and has a rather strong odor that is said to combine the odours of peanut and garlic. It is composed mainly of triglycerides and contains many triterpenoid compounds, which are responsible for the bitter taste. It is hydrophobic in nature and in order to emulsify it in water for application purposes, it must be formulated with appropriate surfactants.



Azadirachtin is the most well known and studied triterpenoid in neem oil. The azadirachtin content of neem oil varies from 300ppm to over 2500ppm depending on the extraction technology and quality of the neem seeds crushed. Neem oil also contains steroids (campesterol, beta-sitosterol, stigmasterol).

Average composition of neem oil fatty acids		
Common Name	Acid Name	Composition range
Omega-6	Linoleic acid	6-16%
Omega-9	Oleic acid	25-54%
Palmitic acid	Hexadecanoic acid	16-33%
Stearic acid	Octadecanoic acid	9-24%
Omega-3	Alpha-linolenic acid	?%
Palmitoleic acid	9-Hexadecenoic acid	?%

Neem oil Method

The method of processing is likely to affect the composition of the oil, since the methods used, such as pressing (expelling) or solvent extraction are unlikely to remove exactly the same mix of components in

the same proportions. The neem oil yield that can be obtained from neem seed kernels also varies widely in literature from 25% to 45%.

The oil can be obtained through pressing (crushing) of the seed kernel both through cold pressing or through a process incorporating temperature controls. Neem seed oil can also be obtained by solvent extraction of the neem seed, fruit, oil, cake or kernel. A large industry in India extracts the oil remaining in the seed cake using hexane. This solvent-extracted oil is of a lower quality as compared to the cold pressed oil and is mostly used for soap manufacturing.

Neem cake: is a by-product obtained in the solvent extraction process for neem oil.

Uses

Neem oil is not used for cooking purposes. In India, it is used for preparing cosmetics (soap, hair products, body hygiene creams, hand creams) and in Ayurvedic, Unani and folklore traditional medicine, in the treatment of a wide range of afflictions. The most frequently reported indications in ancient Ayurvedic writings are skin diseases, inflammations and fevers, and more recently rheumatic disorders, insect repellent and insecticide effects.^[1]

Traditional Ayurvedic uses of neem include the treatment of acne, fever, leprosy, malaria, ophthalmia and tuberculosis. Various folk remedies for neem include use as an anthelmintic, antifeedant, antiseptic, diuretic, emmenagogue, contraceptive, febrifuge, parasiticide, pediculocide and insecticide. It has been used in traditional medicine for the treatment of tetanus, urticaria, eczema, scrofula and erysipelas. Traditional routes of administration of neem extracts included oral, vaginal and topical use. Neem oil has an extensive history of human use in India and surrounding regions for a variety of therapeutic purposes. Puri (1999) has given an account of traditional uses and therapeutic indications and pharmacological studies of this oil, in his book on *neem*.

Formulations made of neem oil also find wide usage as a biopesticide for organic farming, as it repels a wide variety of pests including the mealy bug, beet armyworm, aphids, the cabbage worm, thrips, whiteflies, mites, fungus gnats, beetles, moth larvae, mushroom flies, leafminers, caterpillars, locust, nematodes and the Japanese beetle. Neem oil is not known to be harmful to mammals, birds, earthworms or some beneficial insects such as butterflies, honeybees and ladybugs if it is not concentrated directly into their area of habitat or on their food source. It can be used as a household pesticide for ant, bedbug, cockroach, housefly, sand fly, snail, termite and mosquitoes both as repellent and larvicide (Puri 1999). Neem oil also controls black spot, powdery mildew, anthracnose and rust (fungus).

Neem seed oil has also been found to prevent implantation and may even have an abortifacient effect similar to pennyroyal, juniper berries, wild ginger, myrrh and angelica. The effects were seen as many as ten days after fertilization in rats though it was most effective at no more than three days. (Sinha, et al., 1984); (Lal et al., 1985). In a study on rats, neem oil was given orally eight to ten days after implantation of the fetus on the uterine wall. In all cases, by day 15, the embryos were all completely resorbed by the body. The animals regained fertility on the next cycle showing no physical problems. Detailed study of the rats revealed increased levels of gamma interferon in the uterus. The neem oil enhanced the local immune response in the uterus. (Mukherjee, 1996) Post coital use of neem oil as birth control does not appear to work by hormonal changes but produces changes in the organs that make pregnancy no longer viable (Tewari, 1989) (Bardham, 1991).

Toxicity

Studies done when Azadirachtin (the primary active pesticidal ingredient in neem oil) was approved as a pesticide showed that when neem leaves were fed to male albino rats for 11 weeks, 100% (reversible) infertility resulted.

Neem oil and other neem products such as neem leaves and neem tea should not be consumed by pregnant women, women trying to conceive, or children.

There is some evidence that internal medicinal use may be associated with liver damage in children.^[2]

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MEDICINAL MUSHROOMS

B. N. BANDODKAR COLLEGE OF SCIENCE, THANE.

Nirmesh R. Prajapati and Mohini D. Kushwaha

Teacher Incharge : Dr. (Mrs) Anita Goswami-Giri

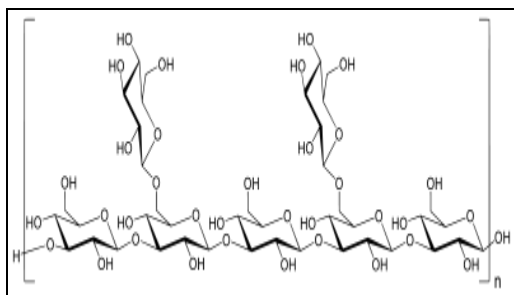
Medicinal mushrooms are mushrooms that are used or studied as possible treatments for diseases. Research shows that various species of mushrooms produce antiviral, antimicrobial, anticancer, antihyperglycemic, cardioprotective, and anti-inflammatory compounds. [Lentinan](#), [PSK](#), [AHCC](#), and [schizophyllan](#), are mushroom extract [nutraceuticals](#).



ORGANIC COMPOUNDS PRESENT IN MEDICINAL MUSHROOM

1) Lentinan

Lentinan is an intravenous anti-tumor [polysaccharide](#) isolated from the fruit body of [shiitake](#) (*Lentinula edodes*). Lentinan has been approved as an adjuvant for stomach cancer in Japan since 1985. Lentinan is one of the host-mediated anti-cancer drugs which has been shown to affect host defense immune systems.



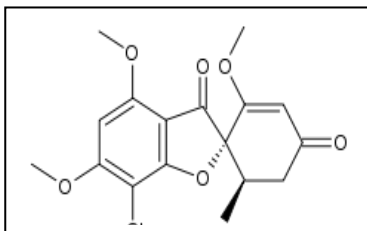
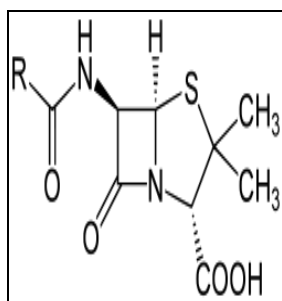
2) Polysaccharide-K

Polysaccharide-K (International brand name: **Krestin**, **PSK**) is a [protein](#)-bound [polysaccharide](#), which is used as an [immune system](#) boosting agent in the treatment of cancer in some countries in Europe as well as China and [Japan](#). In Japan, PSK is approved as an [adjuvant](#) for cancer therapy and is covered by government health insurance.

3) Active Hexose Correlated Compound Active Hexose Correlated Compound (AHCC) is an

alpha-glucan rich nutritional supplement produced from the *mycelia* of shiitake (*Lentinula edodes*) of the basidiomycete family of mushrooms, and is not an approved drug. AHCC was originally designed to lower high-blood pressure.

4) Penicillin & Griseofulvin



5) Irofulven

Irofulven or **6-hydroxymethylacylfulvene** (also known as **HMAF** or **MGI-114**) is

an antitumor agent. It belongs to the family of drugs called **alkylating agents**

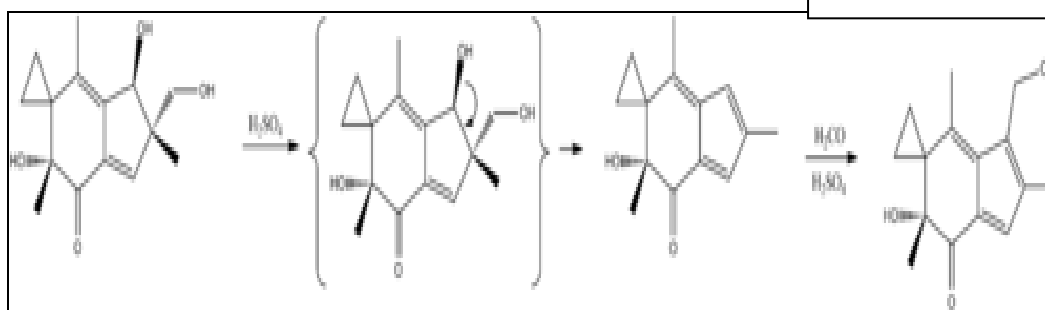
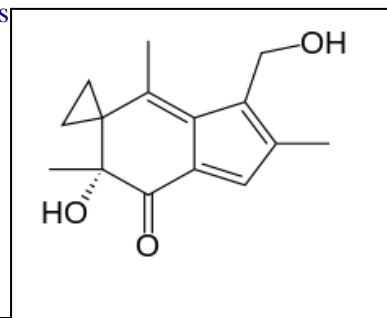
It inhibits the replication of DNA. Irofulven is an **analogue**

of **illudin S**, a **sesquiterpene** toxin found in mushrooms

of the **genus Omphalotus**. The compound was originally synthesized

by Dr. Trevor McMorris (UCSD) and found to have anticancer

properties by Dr. Michael J Kelner (UCSD).



How to Prepare Mushrooms For Medicinal Use

Preparing these mushrooms and even preserving them is not difficult in the least. In fact, multiple medicinal sources suggest that teas or infusions made of mushrooms are the best way to treat a person medicinally. The hot water breaks the polysaccharides out of the undigestible cell walls so that it's immune properties are released and made available.

However, many mushrooms can be dehydrated and stored much like the food we dehydrate. When shiitake mushrooms are cooked or dehydrated their nutritional properties improve.

MEDICINAL MUSHROOMS BENEFITS

1. Anti-Oxidant*

Chaga is unique among medicinal mushrooms. In addition to its potent immune stimulating properties Chaga is also a powerful antioxidant. The Mushroom Science Chaga extract was tested for its anti-oxidant properties by Brunswick Labs.

2. Healthy Skin*

The ability of Tremella to improve the health and complexion of the skin is attributed to the fact that some of the polysaccharides in Tremella can help the body maintain the production of hyaluronic acid, the production of which normally declines as the body ages.

3. Immune Support*

Mushrooms defined as “medicinal” are those mushrooms that contain immune activating beta glucans and other polysaccharides within their indigestible cell walls. When properly extracted with hot water these polysaccharides are used in supplemental form to maintain, protect and support immune health.

4. Increased Energy*

Cordyceps extracts provide immuno-modulating beta glucans that support immune health. Cordyceps extracts also contain adenosine, cordycepic acid, cordycepin and other related compounds.

It is the adenosine and these other related compounds that help with adrenal fatigue and adrenal depletion, and by doing so, can increase energy levels and stamina and endurance.

5. Liver Health*

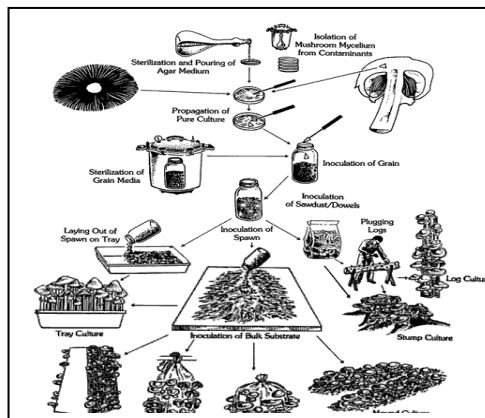
Reishi - In addition to the immuno-modulating beta glucans Reishi also contains active compounds called triterpenes. The triterpenes specific to Reishi are called ganoderic acids.

Triterpenes can improve liver function by helping the liver to clear out accumulated toxins. This is especially important for those people that may have impaired liver function.

For Better Mushroom Industry in India

Most growers in India are self-employed and operating small-scale farms. They have different backgrounds with low or no knowledge of running small biological enterprises. Many short-sighted and non-committed growers are getting out of mushroom growing enterprises due to small setbacks they encounter before they accumulate enough experience in mushroom cultivation management. This situation creates fluctuations in the total number of oyster mushrooms growing units and causes an inconsistent supply-demand curve in the marketplace. This in turn causes the market price for oyster mushroom producing growers to fluctuate. As such, the market of oyster mushroom is highly localized with individual traders having great control on prices. The retail price of fresh oyster mushroom varies in India from INR*30-120 (USD0.66-2.65) per kg.

CULTIVATION OF MUSHROOM BY BIOTECHNOLOGY



Conclusions

Recent investigations carried out in our laboratory showed that medicinal mushrooms occurring in South India namely *Ganoderma lucidum*, *Phellinus rimosus*, *Pleurotus florida* and *Pleurotus pulmonaris* possessed profound antioxidant and antitumor activities. This indicated that these mushrooms would be valuable sources of antioxidant and antitumor compounds. Investigations also showed that they had significant antimutagenic and anticarcinogenic activities. Thus, Indian medicinal mushrooms are potential sources of antioxidant and anticancer compounds. However, intensive and extensive investigations are needed to exploit their valuable therapeutic use.

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ROLE OF WHO IN HERBAL SCIENCE

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WHAT IS WHO ?

- ▶ An intergovernmental organization within the United Nations system whose purpose is to aid in the attainment of the highest possible level of health by all people.
- ▶ Programs include education for current health issues, proper food supply and nutrition, safe water and sanitation, maternal and child health, immunization against major infectious diseases, and prevention and control of diseases.

What is herbal Science?

- Herbal drugs are obtained from the natural resources such as plants, animals.
- These are used for making medicines where the standardization and quality control with proper integration of scientific techniques & traditional knowledge is important.
- Correct identification and quality control of starting material is an essential prerequisite to ensure reproducibility quality of herbal medicine which contributes to its efficacy.
- The standardization of herbal drugs including authentication of genuine drug, harvesting the best quality raw material, assessment of intermediate and finish product & detection of harmful & toxic ingredient.
- Specific markers are required for quantitative studies of herbal products. Markers are mainly categorized in two classes: DNA markers and chemical markers.

Role of WHO in herbal science

- ▶ The World Health Organization (WHO), the specialized agency of the United Nations (UN) that is concerned with international public health, published Quality control methods for medicinal plant materials in 1998 in order to support WHO Member States in establishing quality standards and specifications for herbal materials, within the overall context of quality assurance and control of herbal medicines.
- ▶ The World Health Organization (WHO) estimates that 80 percent of the population of some Asian and African countries presently uses herbal medicine for some aspect of primary health care.

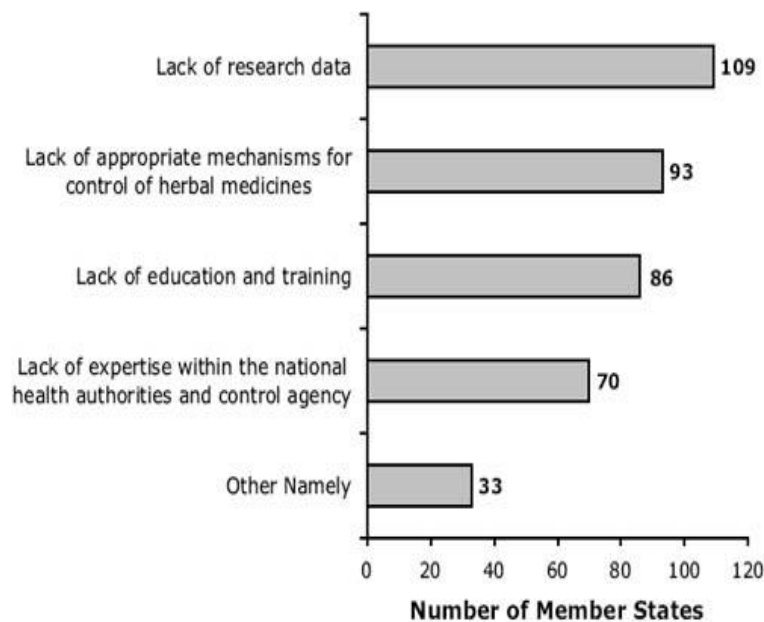
Regulation on herbal science

Main difficulties faced by countries

- ▶ In this section, countries were asked about their specific needs and given the opportunity to provide feedback on the types of support they most needed from WHO. The first

question asked about the main difficulties faced by each Member State regarding regulatory issues for herbal medicines. The options, from which the countries could select all that applied, included the following: lack of research data; lack of expertise within the national health authorities and drug control agency; lack of appropriate mechanisms for control of herbal medicines; lack of education and training; other.

- ▶ A total of 129 countries answered this question; detailed responses are seen in the figure below. The category chosen by the most countries was that of a lack of research data (109 countries), followed by lack of appropriate mechanisms for the control of herbal medicines (93 countries), lack of education and training (86 countries), lack of expertise within the national health authorities and control agency (70 countries) and other (33 countries).



Quality control methods for medicinal plant materials

- ▶ Internationally harmonized tests for assessing the quality of herbal materials, including the determination of pesticide residues, arsenic and toxic heavy metals, microorganisms and aflatoxins.
- ▶ For assessing the **identity**, **purity**, and **content** of herbal materials, intended to assist national laboratories engaged in pharmaceutical quality control.
- ▶ For preparing culture media, strains of **microorganisms** suitable for use in tests, specifications for **adsorbents** for use in thin-Layer chromatography, and detailed descriptions of the reagents, test solutions, and volumetric solutions used in the recommended tests.
- ▶ WHO recommends good practices for pharmaceutical **quality control** laboratories is annexed to this publication for easy reference.

- ▶ Handling herbal medicines, and an example of a list of equipment for phytochemical laboratories is provided therein.
- ▶ Key technical training material for national capacity-building in setting standards for herbal medicines.
- ▶ Implementation of the resolution on Global strategy and plan of action on public health, innovation and intellectual property that was adopted by the Sixty-first World Health Assembly in 2008.

Exploitation and Extinction

Sr.No.	Name of plant	Origin	Diseases
1.	Yew tree	England	Cancer
2.	Hoodia	Nambia	Weight loss
3.	Mangolias	China	Dementia,Cancer
4.	Autumn crocus	India	Gout

HERBAL DRUGS DEVELOPMENT IN INDIA

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1. Introduction

In recent years, plant derived products are increasingly being sought out as medicinal products, nutraceuticals and cosmetics and are available in health food shops and pharmacies over the counter as self-medication or also as drugs prescribed in the non-allopathic systems^{1,2}. Herbal medicines widely used in health-care in both developed and developing countries are complex chemical mixtures prepared from plants and are limited in their effectiveness because they are poorly absorbed when taken orally³. According to an estimate of the World Health Organization (WHO), about 80% of the world population still uses herbs and other traditional medicines for their primary health care needs⁴. Herbal formulations have reached widespread acceptability as therapeutic agents for diabetics, arthritics, liver diseases, cough remedies, memory enhancers and adaptogens⁵. As per WHO definition, there are three kinds of herbal medicines: raw plant material, processed plant material and medicinal

Herbal drug technology

Herbal drug technology involves conversion of botanical materials into medicines where standardization and quality control with proper integration of modern scientific techniques and traditional knowledge is employed, and various drug delivery technologies used for herbal drugs were reported 10-11. Conventional pharmaceutical products, herbal medicinal products may vary in composition and properties, and increasing reports of adverse reactions has drawn the attention of many regulatory agencies for the standardization of herbal formulations. In this context, correct identification and quality assurance is an essential prerequisite to ensure reproducible quality of herbal medicine, which contributes to its safety and efficacy¹². This review article deals with various techniques employed in extraction, characterization and standardization of herbal, polyherbal as well as nanoherbal medicines.

2. Herbal drug standardization

Standardization is a system that ensures a predefined amount of quantity, quality & therapeutic effect of ingredients in each dose¹². Herbal product cannot be considered scientifically valid if the drug tested has not been authenticated and characterized in order to ensure reproducibility in the manufacturing of the product. Moreover, many dangerous and lethal side effects have recently been reported, including direct toxic effects, allergic reactions, effects from contaminants, and interactions with herbal drugs⁶. Therapeutic activity of an herbal formulation depends on its phytochemical constituents. The development of authentic analytical methods which can reliably profile the phytochemical composition, including quantitative analyses of marker/ bioactive compounds and other major constituents, is a major challenge to scientists. In view of the above, standardization is an important step for the establishment of a consistent biological activity, a consistent chemical profile, or simply a quality assurance program for production and manufacturing of an herbal drug. The authentication of herbal drugs and identification of adulterants from genuine medicinal herbs are essential for both pharmaceutical companies as well as public health and to ensure reproducible quality of herbal medicine.

2.1 Conventional methods for standardization of herbal formulation

Standardization of herbal raw drugs include passport data of raw plant drugs, botanical authentication, microscopic & molecular examination, identification of chemical composition by various chromatographic techniques and biological activity of the whole plant.

Macroscopic and microscopic evaluation and chemical profiling of the herbal materials for quality control and standardization have been reported by various workers. Macroscopic identity of medicinal plant materials is based on sensory evaluation parameters like shape, size, colour, texture, odour and taste while microscopy involves comparative microscopic inspection of powdered herbal drug. Further, advances in microscope technology have increased the accuracy and capabilities of microscopy as a mean of herbal crude material identification due to the implication of light and scanning electron microscopes (SEM) in herbal drug standardization¹⁸. Furthermore, various advanced methods such as chromatographic, spectrophotometric and combination of these methods, electrophoresis, polarography, and the use of molecular biomarkers in fingerprints are currently employed in standardization of herbal drugs. The history of some important events such as government policies, quality control and standardization of herbal drugs is given in Table 1. A schematic representation of herbal drug standardization is shown in Figure 1.

2.2 Standardization of herbal formulation

Standardization of herbal formulation requires implementation of Good Manufacturing Practices (GMP) . In addition, study of various parameters such as pharmacodynamics, pharmacokinetics, dosage, stability, self-life, toxicity evaluation, chemical profiling of the herbal formulations is considered essential. Other factors such as pesticides residue, aflatoxine content, heavy metals contamination, Good Agricultural Practices (GAP) in herbal drug standardization are equally important.

Literature on Indian medicinal plants

There is vast literature on Ayurveda in Sanskrit, Hindi and regional languages that is often not accessible to the other language groups. The monographs and books in English are also available. But sometimes there are errors in translating the technical Sanskrit and Indian words into English. It is desirable that prior to embarking on developing any Indian herbal drug, the original Sanskrit textbooks or the experts and scholars of Ayurveda are properly consulted. There have been many scientific reviews on Indian medicinal plants too. Table lists some of the highly recommended books, monographs and reviews that can be used as per the needs of the reader. There has been an ongoing major CSIR effort of digitizing the traditional Ayurvedic knowledge library (TKDL).

HERBAL COSMETICS

ARTI BONDGE and PRATIMA CHAUGULE,

ABSTRACT

Mother nature has provided human, the favorite creation of god with all that he needed to live on this earth water to quench thirst, air to breathe, grain to hunger, fire to light and so on. Human body is the microcosm of the entire cosmos and the answer to all human problems lies in maintaining harmony with the cosmic rhythm. Nature has offered the means to maintain that balance. Herbs! yes herbs are one such means. An herb is a plant or plant extract including leaves, bark, berries, roots, gums, seeds, stems and flowers which is bestowed with nourishing and healing elements. Herbs are the endowment of Mother Nature which has been used for healthcare throughout different ages and cultures of human history. Herbal cosmetics are defined as the beauty products which possess desirable physiological activity such as healing, smoothing appearance, enhancing and conditioning properties because of herbal ingredient.

INTRODUCTION

Now-a-days, in the whole world there is a turn to return towards the use of herbal products & to adopt more natural food, herbal medicines & natural curing practices for healthy life. There is much craze for the vegetable products cultivated through biological/organic farming without using synthetic fertilizers & pesticides. The usage of herbal cosmetics has been increased to many folds in personal care system & there is a great demand for herbal cosmetics. All this happened due to excessive use of synthetic based products, synthetic chemicals, chemical dyes & their derived products in the last one & half century their production & usage cause human health hazard with several side-effects leading to numerous diseases. It also caused considerable environmental pollution & disturbed our eco-system.

PREPARATION OF HERBAL COSMETICS

The preparation of any herbal cosmetics basically follows the same procedure as in the case of cosmetics. In the preparation, suitable bioactive ingredients or their extracts are used along with requisite ingredients basically used for cosmetics. Requires selection of suitable emulsifying agent appropriate ingredient composition and modified methodology to obtain desirable product of specified parameters. Association of botanicals and traditional cosmetics ingredients affects finished product, which ultimately requires modification in ingredients composition and formulation methods. The herbal cosmetics formulation is a sophisticated and sensitive technological profile because it retains the bioactivity of the botanical during excessive processing and ascertain their availability after application on skin. It is desirable that manufacture should ensure the quality of product through systematic testing at their level. Other parameters like organoleptic characteristics, pH, viscosity also be evaluated.

HOW TO USE HERB IN COSMETICS

In earlier times herbal drug or herbs were used for both medicinal purposes as well as for beautification. They have been used in fresh form & dried form. These can be used by making some preparation or directly applying to the body without using other ingredients. In fact in earlier times these were used this

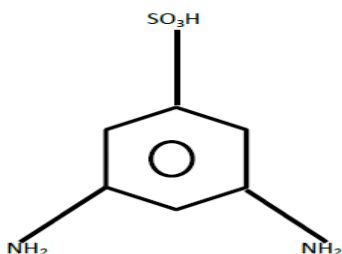
way but now a day their extract decoction, infusion, tinctures, steam distillates etc. are used rather than herbs themselves. Whenever these are prepared preservatives should be added to them as these are perishable

The large no of phytoconstituents are used in cosmetics preparations. Some of them mentioned below RETINIC ACID, ALPHA HYDROXY ACID VITAMIN-C & E etc.

ADVANTAGES OF HERBAL COMETETICS

1. Medicinal plants have a renewable source which is our only hope for sustainable supplies of cheaper medicines for the world growing population.
2. Herbal cosmetics have long history of use and better patient 'tolerance as well as acceptance.
3. Prolong and apparently uneventful use of herbal medicines has provided many offer testimony of their safety and efficacy.
4. The cultivation and processing of medicinal herbs and herbal products is environmental friendly.

The Herbarie products include:



M-Phynelyne diamine sulphonic acid Used in hair dye

USES

Carica papaya linn.(papaya);Through out india:

Milky juice of unripe fruit is a good ingredient for facial & face cream;pulp make skin soft & remove blemishes.leaves &seed extract are usefull for skin infection,ringwarm etc.

Phyllanthus embica Linn.(Amla);Through out india:

- Botanical Extracts and Botanical Complexes
- Hydrosols and Distillates
- Dried Botanicals
- Cosmetic Active Ingredients
- Anti-Aging
- Hydrolyzed Proteins
- Emulsifiers
- Surfactants and Surfactant Concentrates
- Emollients
- Conditioners and Thickeners
- Antioxidants
- Skin and Hair Nutrients

- Hydrolyzed Proteins
- Preservatives
- Oils and Butters
- Essential Oils

CONCLUSION

The usage of herbal cosmetics has been increased to many folds in personal care system & there is a great demand for the herbal cosmetics. Personal care industry is currently more concentrated on these herbal-based cosmetics as now-a-days it is a fast growing segment with a vast scope of manifold expansion in coming years. The use of bioactive ingredients in cosmetics influence biological functions of skin & provide nutrients necessary for the healthy skin or hair. In general, botanicals provide different vitamins, antioxidants, various oils, essential oils, hydrocolloids, proteins, terpenoids & other bioactive molecules. There is tremendous scope of launch numerous herbal cosmetics using appropriate bioactive ingredients with suitable fatty oil, essential oils, proteins & additives. It is mandatory that adequate safety testing should be conducted according to existing rules & well-documented along with the ingredients composition. Under current scenario, Indian market contribution is very less, which could be enhanced through systematic R & D efforts but it requires active collaboration amongst scientists, technologists, cosmetic industry & government organization.

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INDIAN SYSTEM OF MEDICINE

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Abstract

Medicinal plants based traditional systems of medicines are playing important role in providing health care to large section of population, especially in developing countries. Interest in them and utilization of herbal products produced based on them is increasing in developed countries also, Indian Systems of Medicine are among the well known global traditional systems of medicine. The aspects covered include information about historical background, conceptual basis, different disciplines studied in the systems, Research and Development aspects, Drug manufacturing aspects and impact of globalization on Ayurveda. In addition, basic information on Siddha and Unani systems has also been provided.

Introduction

It is a well-known fact that Traditional Systems of medicines always played important role in meeting the global health care needs. They are continuing to do so at present and shall play major role in future also. The system of medicines which are considered to be Indian in origin or the systems of medicine, which have come to India from outside and got assimilated in to Indian culture are known as Indian Systems of Medicine .India has the unique distinction of having six recognized systems of medicine in this category. They are-Ayurveda, Siddha, Unani and Yoga, Naturopathy and Homoeopathy. Though Homoeopathy came to India in 18th Century, it completely assimilated in to the Indian culture and got enriched like any other traditional system hence it is considered as part of Indian Systems of Medicine. In the present review, attempt would be made to provide brief profile of three systems to familiarize the readers about them so as to facilitate acquisition of further information.

AYURVEDA: THE INDIAN SYSTEM OF MEDICINE

AYURVEDA - THE INDIAN SYSTEM OF MEDICINE

Ayurveda literally means the 'science of life'. It is a holistic system of medicine in India which is more than 5000 years old. It forms part of the ancient Indian text 'ATHARVA VEDA'. Ayurveda is based on the interdependence of man and nature. Every living and non-living things are mutually interlinked and man is a microcosm of the universe. At birth every one is born in a state of balance with himself and the universe. But later in life this fragile balance is disrupted due to physical, emotional or spiritual disturbances. Disease is therefore is due to our disharmony with the universe.

BRANCHES OF STUDY

There are eight branches of study in Ayurveda, they are:

1. Kaya Chikitsa (General Medicine)
2. Kaumara Bhruthya (Paediatrics)
3. Bhutha Vidhya (Psychiatry)

4. Salakya (ENT and Ophthalmology and dentistry)
5. Shalya (Surgery)
6. Agada Tantra (Toxicology)
7. Rasayana (Rejuvenation Therapy)
8. Vajeekarana (Aphrodisiac therapy)

INVENTORS OF AYURVEDA

One was the school of physicians called as '*Dhanvantri Sampradaya*' (Sampradaya means tradition) and the second school of surgeons referred in literature as '*Atreya Sampradaya*'. These schools had their respective representative compilations- **Charaka Samhita** for the school of Medicine and **Sushruta Samhita** for the school of Surgery

Sushruta Samhita primarily deals with different aspects of fundamental principles and theory of surgery.

Dissection and operative procedures are explained making use of vegetables and dead animals. It contains description of about 650 drugs and discusses different aspects related to other surgery related topics such as anatomy, embryology, toxicology and therapeutics. **Vagabhata's 'Astanga-Hridaya'** is considered as another major treatise of **Ayurveda**. The above three documents are popularly known as '*Brihat trayees*' (the big or major three). In addition to these three scholarly and authoritative treatises a vast body of literature exist in the form of compilations covering a period of more than 1500 years. Siddha system of medicine is practiced in some parts of South India especially in the state of Tamilnadu. It has close affinity to Ayurveda yet it maintains a distinctive identity of its own. The term '*Siddha*' has come from '*Siddhi*' - which means achievement.

HERBS

There are many popular herbs with medicinal value and which still continue to be used in India, but here are three which are the most popular.

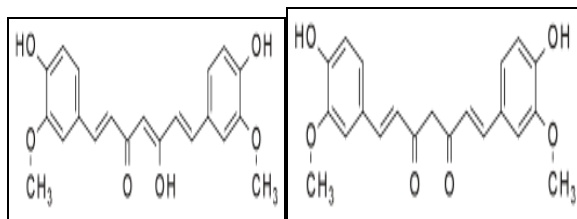
Basil: used in malaria, bronchitis coughs, colds, fevers, headaches, lung problems, abdominal distention, absorption, arthritis, colon (air excess), nasal congestion, nerve tissue strengthening, purifies the air, sinus congestion, clears the lungs, heart tonic and gastric disorders. It also lowers blood sugar levels and its powder is used for mouth ulcers. It is considered sacred and widely worshiped in India.

Ginger: prophylactic of nausea and vomiting associated with motion, sickness, seasickness and pregnancy. Also known for its gastrointestinal benefits

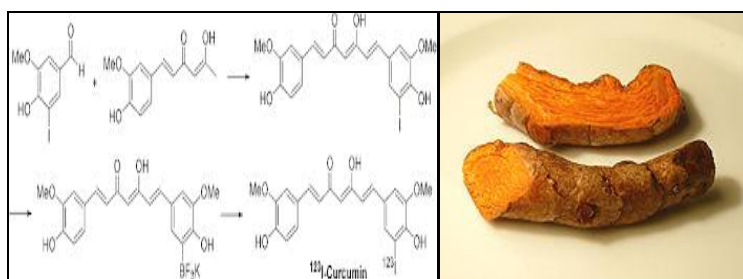
Turmeric: balances cholesterol level, fights allergies, detoxifies the liver, stimulates digestion, boosts immunity and enhances complexion. In fact it is popular among woman in India as a beauty aid.

Turmeric contains up to 5% essential oils and up to 5% curcumin, a polyphenol. The systematic chemical name is (1*E*,6*E*)-1,7-bis(4-hydroxy-3-methoxyphenyl)-1,6-heptadiene-3,5-dione.

It can exist at least in two tautomeric forms, keto and enol. The keto form is preferred in solid phase and the enol form in solution. Curcumin is a pH indicator. In acidic solutions (pH <7.4) it turns yellow, whereas in basic (pH > 8.6) solutions it turns bright red.



Curcumin enol form Curcumin keto form



Synthesis of Curcumin

Turmeric rhizome

Phytochemicals found in turmeric have been investigated in preliminary research for their potential effects on diseases, such as cancer, arthritis, diabetes and other clinical disorders. As an example of such basic research, turmeric reduced the severity of pancreatitis-associated lung injury in mice.

According to one report, research activity into curcumin and turmeric is increasing. The U.S. National Institutes of Health currently has registered 71 clinical trials completed or underway to study use of dietary curcumin for a variety of clinical disorders.

Turmeric rhizome

Some research shows compounds in turmeric to have anti-fungal and anti-bacterial properties; however, curcumin is not one of them.

In another preliminary research example, curcumin is being studied for whether it alters the response to chemotherapy in patients with advanced bowel cancer, as found in a laboratory study.

Dye :

Turmeric makes a poor fabric dye, as it is not very light fast. However, turmeric is commonly used in Indian and Bangladeshi clothing, such as saris and Buddhist monks' robes.

Turmeric leaf oil, Turmeric Oil (*Curcuma longa*)

Origin of Turmeric leaf essential oil:

The traditional use of turmeric was in India as an antiseptic. It has been in very wide use by women for skin care, particularly to discourage facial hair and acne. Turmeric is also well known as a domestic spice around the world. It is found in abundant in southern parts of India.

Description of Turmeric leaf essential oil:

Turmeric is a perennial plant with roots or tubers about 1 metre in height. Rhizome thick much-branched, large leaves, golden yellow. Turmeric is also called '**Indian saffron**' because of its brilliant yellow color and Indian turmeric is considered the best in the world.

Appearance : Thin liquid

Aroma : Spicy, Earthy, Warm-woody

Color : Yellow to slightly yellow green

Chemical constituents: Turmeric leaf oil has various chemical compounds that include phellandrene, limonene, zingiberene, curcumene, turmerone, turmerone, turmerone and cineole

Extraction: Turmeric oil is extracted by the steam distillation of roots and rhizome.

Aromatherapy**uses:**

The properties are aphrodisiac, analgesic, anti-arthritis, anti-inflammatory, anti-oxidant, anti-tumoral, bactericidal, diuretic, hypotensive, insecticidal, laxative, rubefacient and digestive stimulant. Turmeric is seen as an excellent natural antibiotic, while at the same time it strengthens digestion and helps improve intestinal flora. It is a good anti-bacterial for chronically weak or ill. It not only purifies the blood, but also warms it and stimulates formation of new blood tissue. It is bitter, slightly pungent and a good blood purifier, and works as a tonic to aid digestion and relieve congestion. It has a soothing action on respiratory ailments such as cough and asthma. It also is antiarthritic and acts as a natural anti-bacterial

Pharmaceutical**Uses:**

The most active component is curcumin, an orange-yellow volatile oil that includes three curcuminoids, atlantone and zingiberone. Research shows that turmeric and its curcuminoids have a number of beneficial properties:

- It acts as a good antioxidant, comparing well with vitamin C, vitamin E and superoxide dismutase.
- It is good anti-inflammatory that is comparable to steroidal and nonsteroidal drugs.
- It has anticancerous properties affecting all the steps of cancer formation: initiation, promotion and progression.
- It protects the cardiovascular system by lowering serum cholesterol and inhibiting platelet aggregation.
- It protects the liver by several mechanisms thereby curing jaundice and other liver disorders.
- It is helpful in vitro and in vivo studies which show that curcuminoids can help with HIV in a number of ways, including acting as biological response modifiers, resulting in significant increases in CD-4 and CD-8 counts.

Industrial**uses:**

It is one of the most important colouring materials of India. The leaf oil yield the orange-red dye. It is much used to impart a yellow colour to cloth. In Himalayan region dried roots are used in many religious practices and its powder is used as pithiya (for tilaka). Turmeric colour also serves as a chemical indicator since it changes its colour on adding acids or alkalies.

Curcuma oil (obtained from turmeric) is an effective mosquito repellent and compares favorably with dimethyl phthalate in its repellent action against mosquitoes. Natural dyes derived from plant extracts are being used in hair colorant products; curcumin from turmeric also used in natural dye produces a range of color from yellow to deep orange. The oleoresin obtained by extraction of tubers of *Curcuma longa* with volatile solvents and chiefly contains resin and yellow colouring matter known as curcuminoids which is used extensively in fragrance creation in perfumery industry.

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- Royal Botanical Gardens, UK. "Turmeric - History". *Plant Cultures*. Royal Botanical Gardens. Retrieved 11 October 2012.

LIFE TIME FREE SOURCE OF ENERGY

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INTRODUCTION

The project “LIFE TIME FREE SOURCE OF ENERGY” is about the utilization of solar energy (non-exhausting energy resource) in the place of exhaustive fuels. The solar energy is freely available in nature, environmental friendly and even non-polluting energy source which can be used in various ways in day to day life instead of exhausting and other resource. And even the running cost of solar energy utilization is economical compared to existing conventional fuels and energy resources.

In order to complete this project various books were referred. Various documentaries were viewed from different region. Comparison and utilization of solar were studied. The residential areas, industrial areas etc., where solar devices like water heater, cooker, voltaic cell and refrigerator are used to their fullest capability were visited, processes were studied, observed, photos were taken, cost comparison was made. Finally the title was selected and project was completed.

What IS SOLAR ENERGY?

There are nuclear reactions of fusion from “hydrogen” into “helium” taking place in the sun. The nuclear reactions release huge energy and radiate the energy to space continuously. This kind of energy is the solar energy.

The average intensity of solar radiation on the earth orbit is 1367kw/m^2 , and the earth's equatorial circumference is 40,000km, so it can be worked out that the energy the earth obtains is up to 173,000tw. That is to say that it is equivalent to 5 million tons of coal that the sun radiates solar energy to the earth per minute. The nuclear reactions of fusion in the sun can last for several billion to more than ten billion years, so it can be said that the sun is a huge, long, endless energy source and human beings depend on the energy for living.

The solar energy is a primary energy source, and it is also renewable energy. It is rich in resources without transport, which is both free for use and non-contaminative to the environment. But the solar energy has two major drawbacks:

1. The energy flow density is low.
2. The intensity is influenced by various factors (seasons, location, climate, etc.), so it cannot maintain a constant. The two major drawbacks greatly limit the effective use of solar energy.

There is a long history for human to use solar energy. In the period of warring states, some 2,000 years ago, Chinese people knew how to use a four-side steel mirror to focus the sunlight for making a fire, and they used solar energy to dry agricultural products. In modern times, the use of solar energy becomes increasingly widespread, which includes solar thermal utilization and solar photochemical utilization etc.

APPLICATION OF SOLAR ENERGY:

1. Solar water heating.
2. Solar cooker
3. Solar refrigerator
4. Solar photo voltaic cells
5. Solar electric power generation
6. Solar engines for water heating
7. Salt production by evaporation of seawater
8. Solar drying of agricultural and animal product

1. SOLAR WATER HEATER

It is a device to heat water using solar energy. Solar water heaters are one of the best options to be adapted in developing country. Solar water heating systems are commercially produced in the country. Most of the systems available in India are designed to give water temperature from 60c to 90c. These are suitable for heating feed water to boiler and processing industries and hot water applications in hotels, bakeries, industries, residential areas etc.

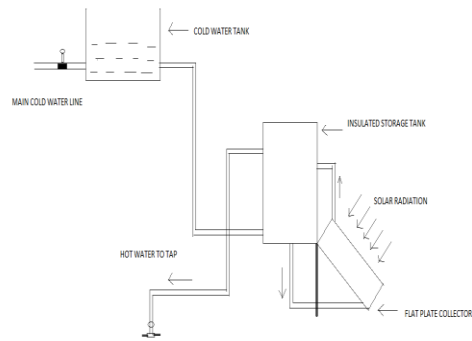
Construction

1. A simple type of solar water heater used for domestic purpose mainly consist of 2 parts
 - a) A insulated storage tank
 - b) Flat plate collector
2. In flat plate collector, copper pipes with its outer surface painted black are fixed in the form of coil in a box. Bending of pipes helps to increase the surface area for heating.
3. The insulated storage tank is connected to the flat plate collector by copper pipe. One end of copper pipe is connected to the bottom of tank while other end is connected to the middle of the tank.
4. A reservoir or storage tank is kept at a higher level. It is used to store cold water and is connected to the insulated storage water tank.

WORKING

- i. The water in the flat plate collector continuously circulates through copper pipe absorbing solar radiation and gets heated up.
- ii. Once the water gets heated up, it expands and become lighter and rises to top of storage tank. Hot water is lighter and remains in the upper part of tank. The hot water can be drawn through a pipe.
- iii. Its place is taken by cold water from the bottom of the reservoir tank.

DIAGRAM



COMPARISON OF SOLAR WATER HEATERS WITH:

1. OIL FIRED BOILER

a) system capacity	125 LPD
b) average output temp	65 c
c) average input temperature	25 c
d) Total heat gain	System capacity temperature difference=12540=5000 kcal
e) Approximate total cost	Rs 22000/-
f) Boiler efficiency	80%
g) Operational days in year	300
h) Calorific value of oil	10280 kcal/kg
i) Purchase cost	Rs 35/- per liter
j) Specific gravity of oil	0.8
k) Oil required per day	Heat gain / calorific value Sp.Gr efficiency) =5000/10280 0.8 0.8= 0.76 liters
l) Savings per day	0.76 Rs 35/- = Rs26.6/-
m) Saving per year	26.6 300= Rs 7980/-
n) Payback period	Net cost/saving per year =22000/798
o) Payback period	2.75 years

2. LPG GAS	125 LPD
a) system capacity	
b) Average output temperature	65 c
c) Average input temperature	25 c
d) Total heat gain	System capacity temp difference=125 40=5000 kcal
e) Approximate total cost	Rs 22000/-
f) Efficiency	80%
g) Operational days in year	300
h) calorific value of oil	11900 kcal/kg
i) Purchase cost	Rs 32/- per kg
j) Specific gravity of oil	0.54
k) Oil required per day	Heat gain /(calorific value specific gravity efficiency)=5000/11900 0.54 0.8=0.97 kg/day
l) Savings per day	0.97 32= Rs 31.04/-
m) Savings per year	31.04 300 =Rs 9312/-
n) Payback period	Net cost /Savings per year 22000 /9312
o) payback period	2.36 years

3.ELECTRIC GEYSERS

a) System capacity	125 LPD
b) Average output temperature	65 c
c) Average input temperature	25 c
d) Total heat gain (kcal)	System capacity temp difference= 12540=5000 kcal/day
e) Total heat gain (kwh/day)	21000/3600 kwh/day
f) Savings in electricity	5.83 kwh/day
g) Approximate total cost	Rs 22000/-
h) cost of electricity	Rs 4.50 per unit (kwh)
i) Saving cost	Unit saved cost per unit =5.88 4.50 =Rs 26.23/-
j) Saving per day	Rs 26.23
k) Saving per year	26.23 300=Rs 78691/-
l) payback period	Total cost / saving per year =22000/7869 = 2.79 year

PLACES

1. restige valley, G.B road, Thane(west)
2. aying guest flats, Siddarth Nagar A-502, Sai Tirth Thane east, Maharashtra.
3. mbaji apt, ground floor, commercial complex, Devi dayal cross road, Mulund west, Mumbai, MH.

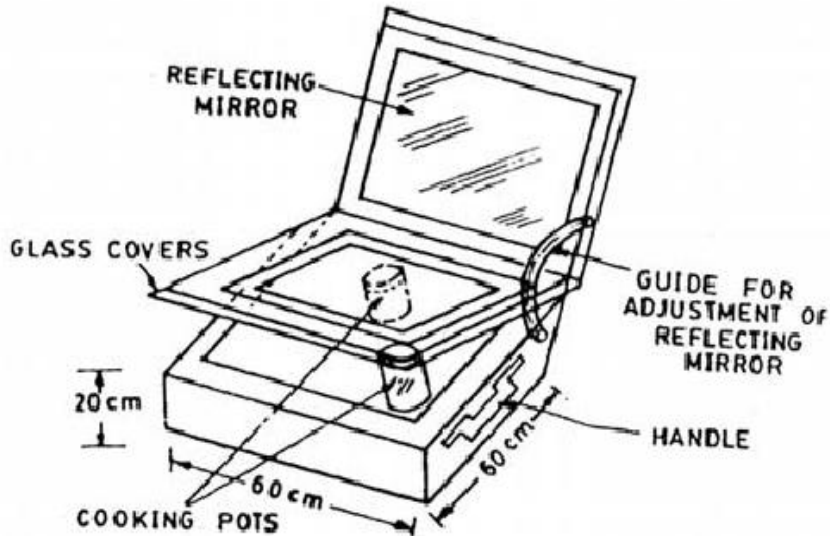


2. SOLAR COOKER

- i.* A commonly used box-type solar cooker is made from non conducting materials like plastic fiberglass.
- ii.* The inner surface of solar cooker box and outer surface of cooking pots is painted black. The black surface absorbs 98% of incident heat radiation.
- iii.* The walls of box are thickened with a lining of non conducting materials to prevent loss of heat.
- iv.* A glass cover is placed on top of the box which facilities retention of heat inside.
- v.* A plane mirror hinged on top of box and adjusted to reflect maximum heat radiation into the enclosure.
- vi.* The food to be cooked is kept in shallow vessels or metal cooking pots which are then placed into the enclosure.
- vii.* The temperature inside a solar cooker is about 100-140 c when they are kept in sun for two

hours.

- viii. Solar cookers are used to cook food that requires slow heating for example rice, vegetable, dals or pulses, cereals etc.



MERIT AND LIMITATION OF SOLAR COOKER

1. MERIT

- i. No attention is needed during cooking as in other devices.
- ii. No fuel is required.
- iii. Negligible maintenance cost.
- iv. No pollution.
- v. Vitamins of food are not destroyed and food cooked is nutrition and delicious with natural taste.
- vi. No problem of over flowing of food.

2. LIMITATION

- i. One has to cook according to the sunshine, the menu has to preplan.
- ii. One cannot cook at short notices and food cannot be cooked night or during cloudy days.
- iii. It takes comparatively more time.

- iv. Chapattis are not cooked because high temperature for baking is required.

PLACES

1. Bioline technologies, sales office-3A, Alankar towers, old Mumbai – Pune road, Dattawadi, Kalwa (w) Thane, Maharashtra.
2. Jost's engineering company ltd. C-7 wagle industrial estate, road no 12, Thane, 400604, Maharashtra.
3. Stell art engineering works, plot no R 510 MID.c, T.T.T.C Industrial area Rabale, Mumbai, Thane, Maharashtra.

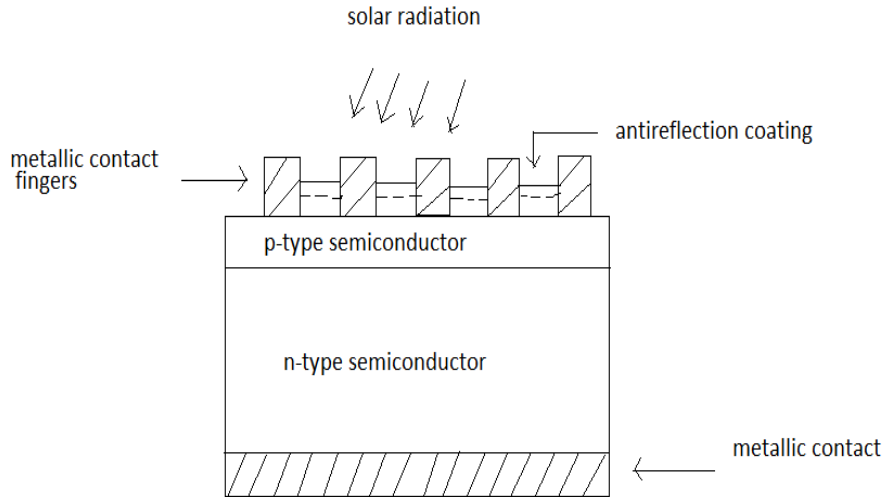


3 . SOLAR PHOTO VOLTAICS

The direct conversion of solar energy into electrical energy by means of photo voltaic effect that is the conversion of light in to electricity.

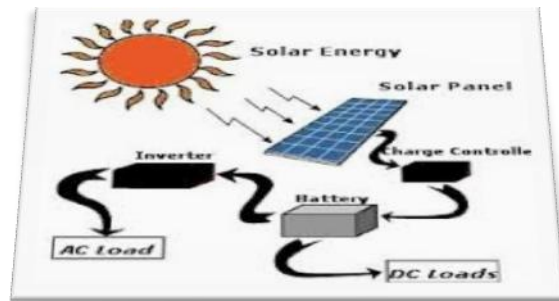
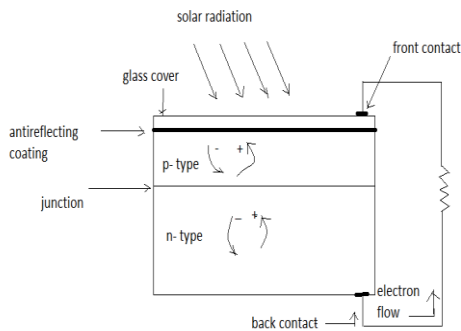
CONSTRUCTION

- i. It works on principle of photovoltaic conversion.
- ii. A solar cell consists of silicon or gallium-arsenide pn-junction diode packed din a can with glass window top.
- iii. The upper layer is of p-type semiconductor.
- iv. It is very thin so that the incident light photons may easily reach the pn-junction.
- v. On the top face of p-layer, the metal finger electrodes are prepared. Sunlight reaches the pn-junction through p-layer.
- vi. An anti- reflecting coating of SiO₂ is applied on the top surface in gap between metallic fingers.
- vii. The active junction area is kept large to get more power.



WORKING

- i. When photons of energy $h\nu > E_g$ (where E_g is the energy band gap at the pn-junction) is incident on the solar cell, it produces additional electron-hole pairs with electrons lofted to the conduction and holes in valence band.
- ii. These electron hole pairs are separated by the potential barrier across the depletion region.
- iii. The electrons on the n-side move to p-side holes in p-side move towards n-side.
- iv. They will be collected at two sides of junction, giving rise to a photo voltage between the top and bottom metal electrodes up to 0.5v to 1.2v.
- v. The top metal contact p-side acts as +ve electrode and bottom metal contact n-side act as -ve electrode.
- vi. When an external load resistance is connected across the electrodes, photoelectric current flows through it.



APPLICATION OF SOLAR PHOTO VOLTAICS CELLS:

1. SOLAR LANTERN

Solar photo voltaic powered lights called lanterns are considered to be alternative solution to lighting needs. A typical solar lantern consists of small photo voltaic module, alighting device, a high frequency investor, battery charge controller and appropriate housing. During day time, module is placed under the sun and is connected to lantern through cable for charging a typical lantern uses a 10 watt lamp. The expected life of lamp is 3 to 5 years.

2. STREET LIGHTING SYSTEM

It consists of two photo voltaic modules mounting frame , 4m long pole, battery box, tubular type lead acid battery, charge, controller, investor and day light senses. Time module sensing is used to switch on light on the evening. It works for one fluorescent tube light of 20 watts for whole night.

OTHER USES OF CELLS

- i. Solar cells are extensively used as main sources of energy for artificial satellites.
- ii. They are widely used in toys and calculators.
- iii. They are used as source of energy for radio or wireless transmissions at TV relay station, traffic signals and stations in the remote areas.

PLACES

- i. Ambaji apt, commercial complex, Devi dayal cross road, Mulund west, Mumbai, Maharashtra.
- ii. Greenery solar power pvt. Ltd. 302, Sai paradise, G.G road, Vishnu nagar, Dombivali west, district thane, Mumbai, Maharashtra.
- iii. Boiline technology, sales office-3A, Alankar towers, old Mumbai, pune road, Dattawadi, Kalwa (w) Thane, Maharashtra.



The CIS Tower, Manchester, England, was clad in PV panels at a cost of £5.5 million. It started feeding electricity to the national grid in November 2005.

4. SOLAR REFRIGERATOR TECHNOLOGY

Photo voltaic refrigerator operate on the same principle as normal compression refrigerators but incorporate low voltage (12 or 24v) dc compressors and motors, rather than main voltage ac types.

Most refrigerators include a freezer compartment for ice pack freezing. Other systems have separate units to provide solely for refrigeration or freezing. Available size range between 10 and 85 liters of vaccine storage capacity with ice production rates up to 6.4 kg per 24 hours.



A typical refrigerator layout

PERFORMANCE

The energy consumption of photo voltaic refrigerator is typically 400-800 watt-hours per 24 hours for a 100 liters refrigerator without ice pack freezing and at +32c ambient temperature. At +43c ambient temperature and freezing 2 kg of ice pack per 24 hours the energy consumption of same refrigerator would rise to about 900-1900 watt-hours per 24 hours. It is very important not to overload a solar refrigerator as this increase energy consumption considerably.

COMPARATIVE COSTS

A solar photo voltaic refrigerator cabinet only is likely to cost around us \$1300-2600 and will cost more to install than kerosene unit. A kerosene refrigerator will cost only us \$650-1300 but will use 0.5-1.4 liters of fuel per day, require frequent maintenance and have a shorter life. In general, life cycle costs are approximately the same for solar and kerosene refrigerator.

PLACES

1. Saikunj India pvt ltd. B2 1704 Rosemary Runwal garden city old Mumbai, Agra road Balkum naka, Thane west, Maharashtra.
2. Paying guest flats, Siddhartha nagar A502 Sai Tirth, Thane east, Maharashtra.

CONCLUSION :ADVANTAGES OF SOLAR ENERGY

- i. Solar energy is an extremely large and inexhaustible source of energy.
- ii. Solar energy is a clean source of energy and it does not cause pollution.

DISADVANTAGES OF SOLAR ENERGY:

- i. Solar energy is a dilute source of energy. Even in the hottest regions on the earth, the solar radiations incident per second on one square meter of earth's surface is less than 1000 Joules.

- ii.* These values are low from point of technological utilization. In order to collect sufficient amount of energy, large surface areas are required which increases cost of solar devices.
- iii.* Solar energy availability varies widely with time. The variation occurs daily because of day-night cycle, seasonal changes and local weather availability of energy varies with time.
- iv.* Hence it becomes necessary to solar energy when the sun is shining. The storage equipments increase the cost of system to be used.

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- iv.* Sustainable Energy Authority Victoria by George Wilkenfeld & Association pty.ltd May 2005

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