SPECTRUM

Science Magazine
Dimoria College

SPECTRUM

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Editor : B. J. Deka

EDITORIAL BOARD :

SPECTRUM

THIS ISSUE CONTAINS...

From the Editor's Desk...

The study of science inculcates a scientific attitude in our approach to various aspects of life. If helps us to develop a scientific temperament as a result of which we acquire certain characteristics like.

* Curiosity
* Alertness
* Disbelieving superstitions
* Open mindedness
* Keenness to get to the root of the problem

Dimoria College is situated in a rural background with inadequate exposure to technology. Hence the college, being only science institute in the region, has to take the responsibility of becoming the torch-bearer in the field of science education and to develop a scientific temperament among the rural masses.

The faculty of Dimoria College have taken the responsibility towards the fulfillment of this assignment. "Spectrum", the science magazine, is a small step towards this goal.

ALOE VERA – THE COSMETIC PLANT

Dr. A. Sarma
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Aloe vera, also known as the **true** or **medicinal aloe**, is a species of succulent plant. *Aloe vera* grows in arid climates and is widely distributed in Africa, India and other arid areas. The species is frequently cited as being used in herbal medicine. Many scientific studies of the use of *aloe vera* have been undertaken, some of them conflicting. Despite these limitations, there is some preliminary evidence that *Aloe vera* extracts may be useful in the treatment of wound and burn healing, minor skin infections, Sebaceous cyst, diabetes and elevated blood lipids in humans. These positive effects are thought to be due to the presence of compounds such as polysaccharides, mannans, anthraquinones and lectins.

DESCRIPTION :

Aloe vera is a stemless or very short-stemmed succulent plant growing to 60–100 cm (24–39 in) tall, spreading by offsets. The leaves are thick and fleshy, green to grey-green with some varieties showing white flecks on the upper and lower stem surfaces. The margin of the leaf is serrated and has small white teeth. The flowers are produced in summer on a spike up to 90 cm (35 in) tall, each flower pendulous, with a yellow tubular corolla.

USES :

In many parts of India, the plant extract is used as a home remedy for numerous skin allergies, acne, fungus infections and beauty-aid. In the state of Kerala, where it is known as *kattar vazha*, *Aloe Vera* is a common household name and for a long time it is being used in Ayurvedic treatment.
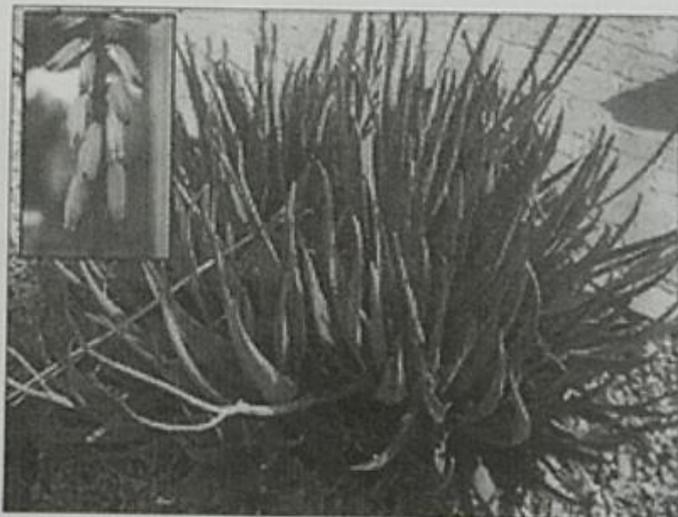
And in the state of Tamil nadu, *Aloe vera* is known as *katraazhai* and it has also a pet name *kumari*. The pulp of the plant is highly regarded for its anti-ageing potential, hence the name kumari..

Scientific evidence for the cosmetic and therapeutic effectiveness of *Aloe vera* is limited and when present is frequently contradictory. Despite this, the cosmetic and alternative medicine industries regularly make claims regarding the soothing, moisturising and healing properties of *Aloe vera*. *Aloe vera* gel is used as an ingredient in commercially available lotion, yogurt, beverages and some desserts. *Aloe vera* juice is used for consumption and relief of digestive issues such as heartburn and irritable bowel syndrome. It is common practice for cosmetic companies to add sap or other derivatives from *Aloe vera* to products such as makeup, tissues, moisturizers, soaps, sunscreens, incense, razors and shampoos.

Aloe vera has a long association with herbal medicine, although it is not known when its medical applications were first discovered. *Aloe vera* is non-toxic, with no known side effects, provided the aloin has been removed by processing. Taking *Aloe vera* that contains aloin in excess amounts has been associated with various side effects. However, the species is used widely in the traditional herbal medicine of China, Japan, Russia, South Africa, the United States, Jamaica, Latin America and India.

Aloe vera is alleged to be effective in treatment of wounds. Evidence on the effects of *Aloe vera* sap on wound healing, however, is limited and contradictory. A more recent review (2007) concludes that the cumulative evidence supports the use of *Aloe vera* for the healing of first to second degree burns. In addition to topical use in wounds or burn healing, internal intake of *Aloe vera* has been linked with improved blood glucose levels in diabetics, and with lower blood lipids in hyperlipidaemic patients, but also with acute hepatitis (liver disease although it can protect from sunburn or suntan.

Aloe vera extracts have antibacterial and antifungal activities which may help in the treatment of minor skin infections, such as boils and benign skin cysts. *Aloe vera* extracts have been shown to inhibit the growth of fungi that cause tinea; however, evidence for control beneath human skin remains to be established.

Aloe vera is now widely used on face tissues, where it is promoted as a moisturiser and/or anti-irritant to reduce chafing of the nose of users who suffer hay-fever or cold. It can also be used to retwist dreadlocked hair, a flavourite agent for vegans and those who prefer natural products. *Aloe Vera* is also used for soothing

the skin, and keeping the skin moist while eliminating the risk of flaky scalp and skin in harsh and dry weather.

Americans were aware of the medicinal and **cosmetic use of** *Aloe vera* plants and termed them as "The wand of heaven". Many international companies manufacturing, exporting and supplying aloe vera cosmetic products like aloe vera natural daily care cream, aloe vera body products, aloe vera skin care creams, aloe vera shampoo, aloe vera face packs and more. *Aloe vera* plants usage and benefits can't be replaced by any other alternative, its globally accepted fact that *Aloe vera* has been making its mark from time to time.

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IMPACT OF NAGAON PAPER MILL,(H.P.C) IN THE SURROUNDING AREA. -AN ENVIRONMENTAL STUDY

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INTRODUCTION

1. Conceptual Framework

A paper Mill of a large magnitude in size is actually a national asset as it helps in developing the industrial scenario as well as solving the unemployment problems beyond doubt. The Nagaon paper Mill is also not acceptation to that direction. The Mill has all the credibility in bringing a dramatic change in the socio-economic condition of the people of the surrounding area but at the same time it is responsible for inviting various environmental problems to the region.

It is a dilemma for man that we need industries to achieve higher economic return to satisfy our ever increasing need in one hand, on the other hand over dependence on industrialization result many unwanted damages to the environment.

The Nagaon paper Mill is started way back in 1985 under the Hindustan paper corporation. It was designed to pulp and paper from the bamboos which are available in the neighbouring areas.

At present the Mill is involved in producing large amount of cultural paper that have heavy demand both in domestic and outside market. Directly and indirectly the industry is helping to provide employment to several hundred of local youths apart from engineers and managerial staff. But it is found that the industry is causing enough environmental problems in due course of time, which sought immediate attention to the government, N.G.O.s and policy makers, environmentalist, and educationist and last but not the least the public of the locality.

The whole environmental issues have cropped up because of the fact that for making paper the paper industry uses a lot of chemicals and other toxic materials such as soap, powder, Rosin, Caustic eye, Caustic Flack, Chlorine, Lime, Alum, Deflower, Wax Emulsion, Felt clearing Agent, Urea, Phosphoric, Hydraulic, Mercury, Dyes, Coal, Furnace oil, Whitening Agent, Sulphuric Acid, Sodium Silicate, Aluminates etc.

The paper Mill releases lakhs of gallons of polluted water to the surrounding region especially in the rainy season. It also emanates cubic feet of toxic gases in the lower layer of atmosphere. The land of the nearby areas of the Mill is now covered by waste materials like coal ashes dissolves limes, caustic lye, caustic flacks etc leading to total damage of the soil and plants of the areas.

The neighboring areas of Nagaon paper Mill is very rich in agriculture and it is known at the rice bowl of the Morigaon District. Apart from rice all kinds of vegetables are grown with less effort by mercy of good soil and natural water supply. The crop fields are well drained through a large number of natural cannels. There are good number of 'Bells' which are source of fishes and various aquatic lives. The area is very rich in forest resource.

Once there were all kinds of wild animals in the forest of the area. The whole area was a roaming ground for different type birds. It is known from the older people of the locality that even some kind of migratory birds also used to visit this region every year. These birds stayed for three to four months in the area. But the establishment of the Mill, gradually these birds stopped to come to the region. The people of the areas feel that as the area is engulfed with toxic gasses so the birds have stopped visiting to this area. Even the local birds are also decreasing day by day.

The emission of toxic gases to the atmosphere has caused serious health hazard to the people of the region. It is reported in the news paper that the number of patients suffering from Bronchial asthma, Lung Problems, cough, Jaundice etc are

increasing day by day in the area.

From the above observation it is very well understood that the environmental problems caused by the Nagaon paper Mill deserves a serious attention by the Government as well as the environmentalist. There is enough scope for researchers to carryout research work in the area. But up till now no serious work has been done in this area on this aspect. Keeping in view above consideration the research work has been carried out.

2.1: LOCATION:

The study area i, c the Nagaon paper Mill and its surrounding area is located in the western part of Nagaon District. The total Geographical area is approximately 102 sq. k. m (30064 areas) it lies on 26° 5 N latitude and 92° 15 E longitudes.

2.2: Schedule:-

District——————————————— Morigaon
Sub-division———————————— Marigaon
Police Station—————————— Jagiroad
State———————————————— Assam
Area————————————————— 355 k.m.

2.3: Villages included in the study area

A. Adjacent Villages of the Mill

Mauza	Villages	Area (in areas)	No. of House Hold
Gobha	1.Nakhola	476	120
	2. Jagiroad	619	105
	3. Nakholagrant	311	98
	4. Tegheria	971	77
	5. Deosal	496	122

B. Villages located in the study area:-

Name of the Villages	Area	Number of House Hold	Population

1. 2 No Brjari	402	26	507
2. Baha pathar	391	182	1011
3. Bhakatgaon	389	321	2022
4. Jagigaon	398	238	1099
5. Baghjap	411	77	2111
6. Natun Bangalbori	418	140	3112
7. Borkuloi Pathar	450	1	3432
8. Saru Kuloi	391	53	2192
9. 1. No. Bangalbori	298	194	3526
10. Borjari	401	74	1012
11. Junbeel	295	104	2021
12. Kharbeel	293	4	2232
13. Bangphor	403	231	3132
14. 1. No. Bangalbori	256	194	3232
15. 2. No. Dungabori	291	156	1962
16. Ghunusha Habi	391	230	2562
17. Tegheria	396	196	2762
18. Roumari	392	200	3932
19. Deusal	399	191	1962
20. Nakhula Gaon	356	180	2172
21. Pachim Nagaon	392	176	2762
22. Hahikuchi	382	156	3101
23. Topatoli	405	201	2962
Total= 23	7461	3335	5,153

Geographical Setting of the study area:-

Physical Setting: - Physiographically the region is a combination of hills and plains. The southern margin of the region is bounded by the beautiful 'sonakuchi hill'. Geographically the plain area is made up of alluvial soil deposited by the Brahmaputra and Kapilee River. The hills of the area are very old archaen rocks.

Environmental Impact of Paper Mill

Impact of air, water and soil pollution in its surrounding.

The Nagaon paper Mill, a mega industrial project started in 1985 to produce paper and pulp from the locally available raw materials mainly bamboo. The Mill requires huge quantities of chemicals in the production of paper and pulp. Apart from chemicals large numbers of toxic elements are also used by the Mill.

List of chemicals used in paper Mill

1. Hydrocarbons
2. Sulphide
3. Phenol
4. Acid and Alkaline waste.
5. Ferric Sulphate
6. Hydrozine
7. Soap stone powder
8. Rosin
9. Costic lye
10. Coutic Flack
11. Chlorine
12. Lime
13. Alum
14. Dealomer
15. Wax Emulsion
16. Felt cleaning Agent.
17. Urea
18. Phosphate
19. Hydraulic
20. Mercury
21. Dyes
22. Coal
23. Furnace oil
24. Whitening agent
25. Sulphuric Acid
26. Sodium Silicate
27. Aluminates etc.

The paper Mill requires 3000 kiloliters of water every day for the production of paper. Out of this water about 70% is discharged every day which is totally unsuitable for further use. The water contains both physical and chemical pollutants. The physical pollutants of the effluent include liquid wastes containing color, odour, taste, oils and waste water. The chemicals pollutants include hydrocarbons, sulphide, phenol, acid and alkaline waste, ferricsulphate, hydrogen and many other chemicals. The pollutants are responsible for imparting dark colour, oily taste and odour creating objectionable conditions to receiving water bodies such as ponds, beels and marhsylands and contact surface. It also imparts toxic effect to plants, aquatic lives and animals. This is why fishes of the beels of the area such as 'Durung ,'Itila', 'Ghagua','Kaikeyee' and 'Jalisara' accumulate various toxic elements in its flesh and bone and become inedible for its taste and smell. The Effluent Treatment Plant (E.T.P) of the Mill finds it quit unable to treat the released water every time and

therefore a huge quantities of water always remain untreated and ultimately flows to the nearby ponds, beels and low lying places. In rainy season these topic particles find their way to board paddy fields of the surrounding region.

Findings of the study are as follows

1. The surrounding villages of the paper Mill are badly affected by the wastages of the paper Mill.

2. The level of Pollution in case of water and air population has gone to that extent that immediate action should be taken against the paper Mill.

3. The villages which are located very much close to the paper Mill are worst affected. The people of those villages have acquired some diseases which are developed only because of the emissions of poisonous gases of the paper Mill.

4. The effluent treatment system is found to be not adequate especially in case of water.

5. The villages are so passive to their surrounding that they take everything very easily as if there is nothing to do in their part to improve the situation.

6. The paper Mill has done almost nothing for the development of socio-economic condition of the people of the region.

7. The subsidiary industries of the paper Mill are causing damages to the environment hand in hand with the paper Mill.

8. The Government, especially the pollution control board has done nothing to control the emission of poisonous gases and the effluents of the paper Mill.

Suggestions for Remedial Measures

The study reveals a number of sensitive issues which sought immediate attention.

1. The paper Mill should install modern high tech machineries to check the poisonous gases emitted from the Mill.

2. The effluent treatment plant should be improved so that in rainy season it is not over flooded.

3. The practice of dumping burned coal ashes and dissolved limestone powder in to the barren fields of the surrounding area of the paper Mill should be stopped.

4. The paper Mill should set up at least five health care centers to check the health related problems of the villagers.

5. The Government should collect necessary data of soil, water and air of the

area and establish monitoring centers.

6. NGO, educational institutions and media should come forward to highlight the problem of the pollution in the greater interest of the society.

CONCLUSION

The paper Mill has affected three vital elements i e land, water and air of the surrounding region. Once the whole region was covered by various types of 'Beel's, Ponds and marshy lands. These 'Beel's and marshy lands are source of different kinds of fishes which are the income source of local tribal people of the area. But gradually due to the emission of gasses and effluents of the mill the region is becoming highly polluted. Now not only the fishes are affected by the pollutants but the very rich bio-diversity of the area is. Already a large number of aquatic species has gone in to the point of extinction. Once the whole region was fully covered with different kind of birds. The area was the favorite place for some migratory birds. These birds are now almost vanished because of the environmental degradation in the area. Apart from land, water and air pollution the large scale cutting of forest is also another cause of diminishing rate of birds. This large –scale forest cut is the result of growing urbanization in the area. Another cause is that the people who are earlier engaged in fishing and agricultural activities now turn themselves in lumbering activities for firewood business.

So far the air is concerned it is found that the whole area is polluted by the emission of the toxic gases of the mill. It is difficult to measure accurately the damage to human health caused by the air pollution. The pollution of air has aggravated the existing illness basically the respiratory emphysema and even Lung Cancer.

The paper mill requires 3000 kiloliters of water every day for different production functions. About 70% of water is discharged every day; this water is totally unsuitable for further use. The physical pollutants of the effluent include liquid waters containing color, odour, taste, oils and hot waste water. The chemical pollutants include hydrocarbons, sulphide, phenol, acidic and alcohol waste, ferric sulphate, hydro zinc and many other chemicals. The pollutants are responsible for imparting dark color, Oily taste and odour creating and objectionable conditions to receiving water bodies such as ponds, bills and marshy lands and contact surfaces and also imparting toxic effects to plants, aquatic life and animals. This is why fish

grown in the bills of the area such as Durung, Itilia, Ghogua, Koikeyee and Jalisara accumulates various toxic elements in its flesh and bones and become inedible for its taste and smell. Although there is an effluent treatment plant (E.T.P.) but a huge amount of water is always remain untreated and ultimately flows to the nearby ponds, bills marshy lands. In rainy season these toxic particles find their way to broad agricultural fields. In this way the paper mill is causing serious damage to the environment as well as to the mankind.

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বিশ্বৰ প্রথম কৃত্রিম বৃক্ক

মমি দাস
উচ্চতৰ মাধ্যমিক দ্বিতীয় বৰ্ষ

বোগাক্রান্ত বৃক্ক আঁতৰাই মানৱদেহৰ সংস্থাপনৰ সম্ভাৱনাৰে পৰিপুষ্ট এক কৃত্রিম বৃক্ক উদ্ভাৱন কৰিছে এগৰাকী ভাৰতীয় বিজ্ঞানী শুভ ৰয়ে। জীৱদেহৰ সংস্থাপন কৰিব পৰা এইটোৱেই প্রথম কৃত্রিম বৃক্ক হিচাপেও পৰিগণিত হৈছে। মানুহৰ শৰীৰত এই কৃত্রিম বৃক্ক সংস্থাপন কৰাটো যদি সম্ভৱ হৈ উঠে, তেন্তে বৃক্ক বিকল হোৱা ৰোগীৰ ক্ষেত্রত 'ডায়েলাইচিছ' কৰাৰ প্রয়োজন নাথাকিব।

কেলিফৰ্ণিয়া বিশ্ববিদ্যালয়ত কর্মৰত আমেৰিকা নিবাসী ভাৰতীয় মূলৰ বিজ্ঞানী শুভ ৰয় পৰিগণিত হৈছে বিশ্বৰ প্রথমটো কৃত্রিম বৃক্কৰ উদ্ভাৱক হিচাপে। তেওঁৰ নেতৃত্বত কেলিফৰ্ণিয়া বিশ্ববিদ্যালয়ৰ এদল গৱেষকে নির্মাণ কৰি উলিওৱা এই কৃত্রিম বৃক্কটোৱে আধুনিক চিকিৎসা বিজ্ঞানৰ এক নতুন দিগন্তৰ সূচনা কৰিছে। ভাৰতীয় মূলৰ বিজ্ঞানী শুভ ৰয়ৰ নেতৃত্বাধীন গৱেষকৰ দলটোৱে উদ্ভাৱন কৰা এই কৃত্রিম বৃক্কটোৰ দুটা অংশ আছে। অত্যাধুনিক তথা অতিশয় সূক্ষ্ম ছিলিকন চিপ'ৰে গঠিত প্রথমটো অংশই ৰোগীৰ তেজ পৰিশোধনেৰে তেজত সৃষ্টি হোৱা বিষাক্ত ৰাসায়নিক পদার্থসমূহ আঁতৰাব পাৰে। আনহাতে দ্বিতীয়টো অংশই পৰিশোধিত তেজ প্রৱাহিত কৰে ৰক্ত পৰিবাহী নলিকাৰে। উল্লেখ্য যে এই কৃত্রিম বৃক্কটোৰ দ্বিতীয় অংশটোও ছিলিকন চিপৰে নির্মাণ কৰা হৈছে যদিও সেই ছিলিকন চিপত সংযোগ কৰা হৈছে মানৱ দেহত থকা বৃক্কৰ কোষ।মানৱ বৃক্কৰ কোষেৰে সমৃদ্ধ এই দ্বিতীয় অংশটোৱে শৰীৰত ডি ভিটামিন উৎপাদন কৰাৰ লগতে ৰক্তচাপ সঠিক ৰূপত নিয়ন্ত্রণ কৰিব পাৰে। গৱেষকৰ দলটোৱে এই কৃত্রিম বৃক্কটোৰ কার্যকাৰিতা সন্দর্ভত ইতিমধ্যে বিভিন্ন পৰীক্ষা-নিৰীক্ষা চলাই আছে আৰু ইয়াৰ অংশ হিচাপে বিভিন্ন প্রাণীৰ দেহত চলোৱা পৰীক্ষণৰ কৃত্রিম বৃক্কটোৰ কার্যকাৰিতা সফল বুলি প্রতিপন্ন হৈছে। এনে অৱস্থাৰ পৰিপ্রেক্ষিতত কৃত্রিম বৃক্কটোৰ কার্যক্ষমতা মানৱ শৰীৰত পৰীক্ষাৰ বাবে প্রস্তুতি চলোৱা হৈছে।

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NANO – The Next revolution

A. K. Buzarbaruah
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'Nanotechnology will be the future with nanoscience developing materials and devices. This will lead to further convergence of technology with wide applications.'

– Former President Dr. A.P.J. Abdul Kalam.

Introduction :

Nanotechnology, emphasised by our respected president, poses a challenge to our younger generation to think of innovative ways of making the world a better place to live in without fear and want. For the first time in the history, humans have acquired the ability to see and manipulate matter at the scale of a nanometer (billionth of a meter). The Nanotechnology which make these possible, is emerging as the all-embracing innovation triggering the next revolution in our daily lives and the materials we handle. The impact of the revolution is expected to be on almost all aspects of our daily life with the promise of finding a solution to many of the pressing problems of the world.

What is Nano?

Nano the Greek word for 'dwarf' indicates one billionth of something. A nanometer (nm) is a billionth of a meter. It is 100,000th the diameter of a human hair. Each nanometer is only three to five atoms wide.

Nanotechnology refers to the technology of rearranging and processing of atoms and molecules to fabricate materials to nanospecifications such as nanometer. The technology will enable scientists and engineers to see and manipulate matter at the molecular level, atom by atom, creates new structures with fundamentally new molecular organisation Matter at the nanoscale is different from its bulk form; its chemical, biological, electrical, magnetic and other properties are different from the properties of macrometer. As a result faster, cheaper and better products would emerge.

New Horizons of Discovery :

The new class of microscopes has led to an amazing discovery, the very properties of matter depends on its size. The nature of matter on a nanoscale is dramatically different from its bulk format. Its optical and electrical properties and even colour changes. New horizons of Discovery, based on this feature are emerging.

Todays nano devices can generally be placed where computers were in the late 1950s. While the Internet has turned into reality the extraordinary facility of connecting anyone, antime, anywhere, nanotechnology is poised to endow ordinary devices and techniques with extraordinary powers.

Initially, biology and electronics are likely to be the major areas of application. Nanotechnology is expected to provide a new tool to read the genetic code. Nano scale robots (called 'nanobots') would be released into the bloodstream programmed to image the affected areas and later on to deliver drugs.

In the field of electronics, nano technology is expected to bring about further miniaturisation in numerous devices as the circuit reduction now being made approaches the limit of resolution set by the physics of diffraction of light.

Risk & growing concern :

There are three major risks in entering the nanoworld. One is posed by terrorists who may deliberately or unwittingly let loose some of the nano weapons being developed with no means to alter the outcome. Another risk is rather subtle and arises from the steady domination of nano robots in everyday life, which will make human intervention difficult. The third is the most dangerous. It is the hazard posed to human life and health by nano particles inhaled in the factory and elsewhere. There is growing concern about these risks.

* * *

BEAUTY OF MATHEMATICS

L. D. Barman
Head, Deptt. of Statistics

Sequential Inputs of numbers with 8

$$1 \times 8 + 1 = 9$$
$$12 \times 8 + 2 = 98$$
$$123 \times 8 + 3 = 987$$
$$1234 \times 8 + 4 = 9876$$
$$12345 \times 8 + 5 = 98765$$
$$123456 \times 8 + 6 = 987654$$
$$1234567 \times 8 + 7 = 9876543$$
$$12345678 \times 8 + 8 = 98765432$$
$$123456789 \times 8 + 9 = 987654321$$

Sequential 1's with 9

$$1 \times 9 + 2 = 11$$
$$12 \times 9 + 3 = 111$$
$$123 \times 9 + 4 = 1111$$
$$1234 \times 9 + 5 = 11111$$
$$12345 \times 9 + 6 = 111111$$
$$123456 \times 9 + 7 = 1111111$$
$$1234567 \times 9 + 8 = 11111111$$
$$12345678 \times 9 + 9 = 111111111$$
$$123456789 \times 9 + 10 = 1111111111$$

Sequential 8's with 9

$$9 \times 9 + 7 = 88$$
$$98 \times 9 + 6 = 888$$
$$987 \times 9 + 5 = 8888$$
$$9876 \times 9 + 4 = 88888$$
$$98765 \times 9 + 3 = 888888$$
$$987654 \times 9 + 2 = 8888888$$
$$9876543 \times 9 + 1 = 88888888$$
$$98765432 \times 9 + 0 = 888888888$$

Numeric Palindrome with 1's

$$1 \times 1 = 1$$
$$11 \times 11 = 121$$
$$111 \times 111 = 12321$$
$$1111 \times 1111 = 1234321$$
$$11111 \times 11111 = 123454321$$
$$111111 \times 111111 = 12345654321$$
$$1111111 \times 1111111 = 1234567654321$$
$$11111111 \times 11111111 = 123456787654321$$
$$111111111 \times 111111111 = 12345678987654321$$

Sequential Inputs of 9

$$9 \times 9 = 81$$
$$99 \times 99 = 9801$$
$$999 \times 999 = 998001$$
$$9999 \times 9999 = 99980001$$
$$99999 \times 99999 = 9999800001$$
$$999999 \times 999999 = 999998000001$$
$$9999999 \times 9999999 = 99999980000001$$
$$99999999 \times 99999999 = 9999999800000001$$
$$999999999 \times 999999999 = 999999998000000001$$

....

Sequential Inputs of 6

$$6 \times 7 = 42$$
$$66 \times 67 = 4422$$
$$666 \times 667 = 444222$$
$$6666 \times 6667 = 44442222$$
$$66666 \times 66667 = 4444422222$$
$$666666 \times 666667 = 444444222222$$
$$6666666 \times 6666667 = 44444442222222$$
$$66666666 \times 66666667 = 4444444422222222$$
$$666666666 \times 666666667 = 444444444222222222$$

....

* * *

PESTICIDES AND ITS IMPACT ON HUMAN LIFE

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Pesticides are chemicals which are used to prevent or to control any pests including unwanted species of plants or animals during production, storage, transport processes. But ignorance about the amount of pesticides used will cause great loss of human as well as living bodies.

Now a days all of us know about the hormone injection used in brinjal, cauliflower, cap etc. But without the knowledge of proper amount and procedure cause a great damage to human life. So proper doses of pesticides as well as other commercial processes must be monitored seriously to prevent a dangerous future.

Monitoring shows residues of different pesticides in different vegetables as shown below :

Vegetable	Pesticides > MRL	MRL (PPm)
Cucumber	Malathion (3.1)	3
Cauliflower	Endosulphen (3.5)	2
Cabbage	Endosulphen (4)	2
Tomato	Endosulphen (4.5)	2
Brinjal	Cypermethrin (2.5)	2
	Endosulphen (2.5)	2

Tests reveal pesticides in coke, pepsi, Mirinda etc. Twelve major cold drinks brands contain a deadly cocktail of pesicides residues, which will cause cancer, birth defects, besides damaging nervous and reproductive system. Cold drinks tested sample contains residue of extremely toxic pesticides and insecticides like Lindane, DDT, Malathion and chlorpyriphos. Total pesticides in all pepsico brands were 0.0180 mg/L which is 36 times higher. Similarly all Coca-cola brands were 30 times higher and Mirinda Lemon are topped above the two brands.

In India mostly teenage and children are drinking these toxic drinks but surprisingly same drinks bottled overseas have undetectable levels of these pesticides residues.

To eliminate the most hazardous pesticides we must be very careful. We may inspire the farmers towards biopesticides and bioherbicides which will not harm the users and also help to the farmers. Lastly we can say BE GREEN, USE GREEN, SAVE GREEN.

* * *

CHILD HEALTH AND ENVIRONMENT

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Degradation means lower in rank. When environmental condition rests in lower rank it is said to be environmental degradation. Generally children are mostly effected by environmental degradation. We know that water is the life of human being but every drop of water can kill children. Children take more water, food and air than adult and that is why they can lead more diseases. It is surprising that children as well as adult carry many unwanted chemical residues. An infant intakes air twice than the adult. An infant drinks 8–12 times more water per kilogram of body weight than adult. Children between the age of 1–5 eat 3–4 times more food per unit body weight than the average adult (Down to Earth). Infant absorb about 50% of Pb and heavy metal present as contamination of food, but in regards to adult only 10%.

As per report of WHO environmental degradation has bad impact upon the health of children. The rich country has surveyed much more between the health and environmental degradation. But in India few studies are carried on for the linking of changing environment to the children. As per medical report, it is found that only at Bangalore the Asthma is found in 2000 children below the age of 18. But it is found that Bangalore has comparatively clean air. The increasing numbers of Asthma is due to rise of urbanization, industrialization and increased vehicular exhaust.

As per study report Indian child has to intake pesticide through food which are also responsible for deformed babies. Again dioxin level is also very high in Indian child. Dioxin is produced by incineration of plastics and vinyl. This dioxin is responsible for mental degradation and systemic cancer.

Moreover, large amount of toxic chemicals are used in industrial processes for making products. Again many restricted and banned pesticides are released every year in the Indian market.

Indian child have to bear two types of burden (a) dirty and unsafe water (b) malnutrition. Presticieds, fertilizer in dust, air, water and food plastic waste become very vulnerable to the child. Life style related diseases like diabetes and obesity effected the urban children because they have no physical exercise. They love junk food (Burgers, Pizzas, Fries) which have no nutritive value and leads an increasingly sedentary life.

Due to polluted environment and toxic chemicals in food children cancer rates in India are going to increase every year. Moreover, plastic toys and teddy bear can lead to impured mental development and growth retardation in the child. It is also noticed that diseases due to life style are more common in the upper middle class than the unprivileged section.

Fast food become the reasons of slow death. According to WHO the young generation facing problem due to overweight, diabetes, high cholesterol due to lack of physical work.

So it may be summed up that by changing life style and food habit we can reduce 80% of heart diseases and 90% diabetes and about 1/3 of all cancers (WHO).

We must be careful about inside pollution because most of time children are staying at home. We may avoid soft toys, junk food, soft drinks etc. for better health of the child. We may introduce some physical activities for our children for better life.

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RAISING A NURSERY : AN IDEA

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NURSERY : The dictionary meaning of which is a piece of ground where the plants are reared or taken care of. Thus raising a nursery means a development of an area where plants can be reared grown and sold out to be precise. So to start a nursery what one need are–

1. Hobby to grow plants.
2. A plot of land which is available to almost all people residing in rural area or atleast an area to keep the pots where huge area in wanting.
3. Source from which one can have the seeds of other accessories.
4. Proper planning should be done before setting nursery.
5. Availability of electric supply, water supply and skilled labour.
6. Personal skill, A market where the products can be sold .

Nursery not only helps one to be self employee, but it solves a number of other problems important of which are – Firstly, the present day unemployment problem can be solve by encouraging nursery establishment among the educated unemployment. Secondly, It solves the problems of the pollution which is one of the burning problem of the todays World. A tree that lives for 50 years generates 5.3 lacs worth oxygen. Recycles Rs. 6.4 lacs worth of air pollution control and Rs. 5.3 lacs worth of shelter for bird and animals. Besides we provides flower, fruits and timber. So, planting one tree worth more than Rs. 32 lacs.

Thirdly, with the increase of interest in Ayurvedic Medicines Nursery man can earn hand-some money planting medicinal plants. Last but not the least it adds to the beauty of our surrounding.

Thus looking at the aforesaid importance the private as well as the government should take policy decision to promote healthy growth of Nursery. Bodies like NABARD and NEDFI is their to provide assistance. But that are not enough for the full flourishment of the sector.

Raising a Nursery is not only a fascinating job but it also helps one to be self employed and give one the opportunity to make some others employed if

it is started in a large scale. Now a days people are becoming more and more interested in hobby goods and so selling is not a problem. Even if some plants are remain they can be kept and used as mother plant for further propagation. Looking at the high profit the number of Nurserys are increasing day by day. Besides other business like bee keeping etc. can also be started along with Nursery with least effort.

However, proper management and care is always required to make the business a success. Regular deweeding, Pruning, Manuring and watering etc. should be done to enhance healthy growth of plants. Moreover, shadenets and green house according to the requirement of the plants should be constructed. Different plots for Orchid, Cacti etc. should be made and take Care of accordingly further more beds for seedling etc. are to be prepared seasonally and watered.

So, what is required to raise a Nursery is devotion, skill, proper planning and knowledge of plantation which can be obtained by prior training to some established Nursery and of course CARE which would surely make it a success. Hence, today youth should come forward and start a Nursery providing their service in solving problem like unemployment, pollution and adding scenic beauty to the world in the wide.

* * *

SAVE OUR WILD WONDERS

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Our world is wonderful and it is full of wonderful creatures. Here we get smallest animals which are not visible with our naked eyes and only with the help of microscope we can see them. On the other hand there are biggest animals which live in water like fish. They are Blue whales an aquatic mammals which gives birth young ones and feed them with milk. It may be 34 meters long and weigh around 152 tones. That's more then ten busses put together. Even the new born baby is huge like an elephant.

Another giant animal found in the miners of Africa. They are looks something like a pig but they are larger than a crocodile. It is called hippopotamus the king of river. It is a herviropass animal. Adult hippos can weigh more the 2,700 kilos. and it may reach 4.6 meters in length and 1.5 meters tall at the shoulder.

Rhinoceros, the pride of Assam is a large hoofed animal characterised by presence of single horn. The average weight is about 2000 kg. In the world there are five species of Rhinoceros. The african rhinos having two horns and Asiatic rhinos having one horn. The horns are made up of skin and hairs. It is a modification of hairs. Rhinoceros is considered to be a highly valuable species because of its horn. It is believed by some people that horn has some medicinal value. So the price of a single horn is about 2.5 lakh in south Asian centuries. For this reason rhinos are killed by poachers causing sharp decline of the population. But there is not any medicinal value of the horn. It is a mere superstition.

The elephant is the largest and heaviest of all terrestrial mammals. It weight about 2500 kilos. The second pair of incissors (teeth) of the upper jaw hare been modified into tusks. The animal is hunted for its tusk which has high commercial value, therefore population is now gradually declining. Destruction of habitation and scarcity of food is also another cause of its decline.

Another wonderful creature is the tiger. It is the most powerful animal among all the cats. Generally, the species, pamthera tigers have eight subspecies. Its length ranges upto 12 feet in length from nose to tip of the tail and height about 36 inches. It has been hunted by man from early times for its skin. It is the top carnivore of the food pyramid. Increasing human population and habitat destruction causes the decline of tiger population from 3642 tigers counted in 2002 there are now only 1411 tigers as of 2008 (India). Tigers play a significant role in balancing the jungle ecosystem (Predator - prey balance) So to protect tiger we must conserve its environment.

So everybody should remember, that the survival or extinction of our natural wonders (species) is in our hands.

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ECO- LEBELLING

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The concept of Eco-labeling is to encourage environmentally friendly commodities in the market. Agenda 21 recommend government to promote environmental labeling in order to change consumption pattern and thereby conserving the environment for sustainable development (UNCED, 19920) Eco-labeling was first introduced in Germany in 1978. Now most of the developed countries sand some developing countries including India has established Eco-labeling programme. European Union implemented voluntary Eco-labeling programme within member countries in 1992

In India, MoEF had lunched the scheme of labeling of environment friendly product in 1991. The scheme identifies 16 categories of consumer products for the purpose of development of eco-criteria and labeling. So, far criteria for 14 categories for products can apply to the *Bureau of Indian standards* (BIS), if their products are meeting the relevant standard notified for the award of *eco-logo*. Ministry has also launched publicity campaigns for providing necessary awareness among the consumer and manufacturers. The scheme could not become popular because of lack of adequate response from the manufacturer.

The ministry has favoured a comparatively simple system in which the criteria for awarding any label should not forgo to quality of a product and should focus primarily on the direct impact of a product during use and disposal, along with aspect of energy efficiency, noise impact (as in case of electrical goods etc) criteria are transparent i.e. very clear and open to all, so that the basic of judgment will be clearly understood and appreciated.

The following primary environmental criteria for products:

- That they cause substantially less pollution than other comparable products in the production, usage and disposal.
- That they are recycled and/or recyclable where comparable products are not.
- That they make a significant contribution to saving non-renewable resources or minimize use of renewable resources compared with other comparable product.

- That they contribute to a reduction of adverse environmental health consequences.
- That their product price is not extra ordinarily higher than comparable products, and
- That they comply with laws, standards and regulation pertaining to the environment.

The *Ministry of Environment and Forest* (MoEF) has set up committee for the functioning of Eco-labeling. It comprises of Steering committee, Technical committee and Executing committee each functioning equally in their areas for *eco-logos* purpose.

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ASTROBIOLOGY- A NEW PERSPECTIVE

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Astrobiology a new exciting interdisciplinary research field, seeks to unravel the origin and evolution of life wherever it might exist in the universe. The current view of the origin of life on earth is that it is strongly connected to the origin and evaluation of our planet and indeed of the universe as a whole. In order to establish a coherent picture of processes that may have played an important role in the chemical evaluation leading to life, we have to understand the evolution of the very early universe. In particular we must investigate the formulation of the biogenic elements in stellar mass loss and explosions. Recent observations, balloon experiments and space mission such as the Wilkinson Microwave Anisotropy Probe (WMAP) have refined the timescale of the universe now known to be 13.7 billion years old and expected to expand forever. The first objects in the universe capable of ionizing gas formed about 200 million years after the big bang. It is generally believed that the elemental composition of the medium out of which the earliest stars and galaxies condensed consisted primarily of H and He. Recent studies of primordial star formation show that in the absence of heavy elements the formation of stars with masses could not have formed before a minimum level of heavy

element enrichment had been reached. This enrichment has an important effect on the fragmentation properties of a gravitationally unstable gas, influencing the fragmentation of could clumps into low mass protostars. The formation and distribution of heavy elements and the formation of low mass stars contain major open questions in the field of astronomy.

In the interstellar medium and circumstellar environments, heavy elements are mixed and complex molecules and dust are formed and continuously modified according to the physical and chemical conditions they experience. New generations of stars and planets arise from agglomeration of dust and gas in interstellar clouds. The last decade has shown an impressive improvement in our understanding of protoplanetary disks and the processes that can form terrestrial and giant planets and the dark worlds at the outer edge of our solar system the kuiper belt region. The disks quickly become planet in some regions, or form small bodies that can eventually collide with already formed planets in others. Consequently it seems possible that both exogenous and endogenous sources of organic matter could have provided the first building blocks of life on the early earth and likely merged to create the atmosphere and hydrosphere in which life flourished. In order to develop insights into the origin and development of life, minor solar system objects (e.g. comets), planetary surface processes, hydrospheres, and atmospheres remain major targets of attention. Impacts and exogenous delivery had both beneficial and destructive effects on the evolution of planetary biospheres; determining the inventories of organic compounds and other volatiles in comets, asteroids, meteorites and interplanetary dust particulars is therefore of major importance.

The transition from abiotic organic matter to entities that we define to be "alive" is not yet understood, nor are the specific conditions on the early earth that must have played a major role in taking that step. The development of multiple processes such as self–replication, autocatalysis, Darwinian molecular stability and reactivity, and membrane formation are among the elementary steps toward molecular evolution and life that need to be further explored. Clues to these past events are encoded in ancient rocks, microfossils, and in the living cells themselves. Morphological, geochemical and isotopic biosignatures in rocks provide crucial records for microbial life in environments that are extreme by human standards improve our understanding of where life may exist elsewhere in the universe.

* * *

FREE RADICALS AND ANTIOXIDANTS

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Within the human body, millions of processes are occurring at all time. The human body is made up of many different types of cells . Every cell in the body needs a steady supply of oxygen to derive energy from digested food . But consuming oxygen also generates free radicals , unstable molecules that can damage healthy cells . Free radicals are highly reactive because they contain an unpaired electron , and electrons prefer to pair up. So these free radicals search for a molecule from which they can steal an electron . The molecular victim then goes in search of an electron to satisfy its deficiency and sets off a chain reaction in the body that results in the creation of more free radicals . A molecule that has lost electrons in this manner is said to have been *oxidized* . Free radicals are known as *oxidants* .

Even with their potential for damage, the presence of a limited number of free radicals in the body is not necessarily dangerous; free radicals are actually part of the normal metabolism of a healthy body . In fact, sometimes the body's immune system's cells create free radicals deliberately in order to neutralize viruses and bacteria .Although all healthy cells produce small amounts of free radicals, there are a variety of other factors that can promote free radical formation in the human body, such as radiation, cigarette smoke, alcohol, and environmental pollutants. Excessive free radicals can damage healthy cells, usually DNA as well as protein and fats. Creation of free radicals by chain reaction in the body weakens immunological functions as well as speeding up the ageing process , and is also linked to several diseases such as cataracts , various forms of cancer and heart disease .

Antioxidants are molecules that reduce the effect of dangerous oxidants or free radicals by binding together with these harmful molecules, decreasing their destructive power. Antioxidants can also help repair damage already sustained by cells. Antioxidants molecules are able to do this because they themselves don't become free radicals in the process – they appear to be stable .

Certain antioxidants enzymes are produced within the body. The most com-

monly naturally occurring antioxidants are *Superoxide Dismutase, Catalase* , and *Glutathione* . *Superoxide Dismutase* change the structure of oxidants and breaks them down into hydrogen peroxide. *Catalase* in turn, breaks down hydrogen peroxide into water and tiny oxygen particles or gases. *Glutathione* is a detoxifying agent, which binds with different toxins to change their form so that they are able to leave the body as waste.

Other antioxidants agents are found in foods , such as dark green leafy vegetables. Items high in vitamin A, Vitamin C, vitamin E, and beta-carotene are believed to be the most beneficial. These nutrients are commonly found in fruits and vegetables , those with the strongest colours being healthiest .

Choosing raw fruits and vegetables rather than cooked, provides the highest concentration and best absorption of antioxidants.

Which foods are rich in antioxidants ?

Fruits and vegetables provide a range of antioxidants, Vitamin A, C and E, carotenoids. Fruits and vegetables that have comparatively high levels of antioxidants includes apples, grapefruit , green grapes, oranges , peach, red plums, strawberries, beetroot, sprouts cauliflower, green cabbage, onion, spinach and tomatoes. Antioxidants areabundant in other foods including nuts, grains and some meats, poultry and fish.

Beta-carotene is found in many foods that are orange in colour, including sweet potatoes, carrots, apricots, pumpkin, and mangoes. Some green leafy vegetables including spinach, are also rich in beta-carotene.

Lutein, best known for its association with healthy eyes, is abundant in green, leafy vegetable, spinach etc.

Lycopene is a potent antioxidant found in tomatoes, watermelon, guava, papaya, apricots , pink grapefruit, oranges, and other foods.

Selenium is a mineral, not an antioxidant nutrient. However, it is a component of antioxidant enzymes. The amount of selenium in soil, which varies by region, determines the amount of selenium in the foods grown in that soil. Animals that eat grains or plants grown in selenium-rich soil have higher levels of selenium in their muscle.

Foods rich in vitamin A includes lever, sweet potatoes, carrots, milk, egg yolks.

Vitamin C is also called ascorbic acid, and can be found in high abundance

in many fruits and vegetables and is also found in cereals, beef, poultry and fish.

Vitamin E is found in almonds, in many oils including wheat germ, sunflower, corn and soybean oils, and found in mangoes, nuts.

All antioxidants are not created equal. If we get an adequate supply of one antioxidant, it doesn't mean we wouldn't benefit by the use of another. There is also such a thing as too much of an antioxidant, vitamin A can be toxic when taken in too large a quantity.

Antioxidants are tools, in a nutritional sense. As we continue to grow in our understanding of what causes cancer and what prevents it, antioxidants may turn out to be an extremely valuable tool.

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ARTIFICIAL NEURAL NETWORKS

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INTRODUCTION

An Artificial Neural Network (ANN) is an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information. The key element of this paradigm is the novel structure of the information processing system. It is composed of a large number of highly interconnected processing elements (neurons) working in unison to solve specific problems. ANNs, like people, learn by example. An ANN is configured for a specific application, such as pattern recognition or data classification, through a learning process. Learning in biological systems involves adjustments of the connections that exist between the neurons.

Why use neural networks?

Neural networks, with their remarkable ability to derive meaning from complicated or imprecise data, can be used to extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques. A trained neural network can be thought of as an "expert" in the category of information it has been given to analyze.

Neural networks versus conventional computers

Neural networks take a different approach to problem solving than that of conventional computers. Conventional computers use an algorithmic approach i.e. the computer follows a set of instructions in order to solve a problem. Unless the specific steps that the computer needs to follow are known the computer cannot solve the problem. That restricts the problem solving capability of conventional computers to problems that we already understand and know how to solve. But computers would be so much more useful if they could do things that we don't exactly know how to do.

Neural networks process information in a similar way the human brain does. The network is composed of a large number of highly interconnected processing elements (neurones) working in parallel to solve a specific problem. Neural networks learn by example. They cannot be programmed to perform a specific task. The examples must be selected carefully otherwise useful time is wasted or even worse the network might be functioning incorrectly. The disadvantage is that because the network finds out how to solve the problem by itself, its operation can be unpredictable.

On the other hand, conventional computers use a cognitive approach to problem solving; the way the problem is to solved must be known and stated in small unambiguous instructions. These instructions are then converted to a high level language program and then into machine code that the computer can understand. These machines are totally predictable; if anything goes wrong is due to a software or hardware fault.

Neural networks and conventional algorithmic computers are not in competition but complement each other. There are tasks are more suited to an algorithmic approach like arithmetic operations and tasks that are more suited to neural networks. Even more, a large number of tasks, require systems that use a combination of the two approaches (normally a conventional computer is used to supervise the neural network) in order to perform at maximum efficiency.

Applications of neural networks

1. Neural Networks in Practice

Neural networks have broad applicability to real world business problems. In fact, they have already been successfully applied in many industries.

Since neural networks are best at identifying patterns or trends in data, they are

well suited for prediction or forecasting needs including: sales forecasting ,industrial process control ,customer research ,data validation ,risk management ,target marketing.

2. Neural networks in medicine

Artificial Neural Networks (ANN) are currently a 'hot' research area in medicine and it is believed that they will receive extensive application to biomedical systems in the next few years. At the moment, the research is mostly on modelling parts of the human body and recognising diseases from various scans (e.g. cardiograms, CAT scans, ultrasonic scans, etc.). Neural networks are ideal in recognising diseases using scans since there is no need to provide a specific algorithm on how to identify the disease. Artificial Neural Networks are mostly used in the following fields-

    i) modelling and diagnosing the cardiovascular system
    ii) electronic noses
    iii) instant physician

3. Neural Networks in business

Business is a diverted field with several general areas of specialisation such as accounting or financial analysis. Almost any neural network application would fit into one business area or financial analysis.

There is some potential for using neural networks for business purposes, including resource allocation and scheduling. There is also a strong potential for using neural networks for database mining, that is, searching for patterns implicit within the explicitly stored information in databases. Most of the funded work in this area is classified as

Neural networks also contribute to other areas of research such as neurology and psychology. They are regularly used to model parts of living organisms and to investigate the internal mechanisms of the brain.

Perhaps the most exciting aspect of neural networks is the possibility that some day 'consious' networks might be produced. There is a number of scientists arguing that conciousness is a 'mechanical' property and that 'consious' neural networks are a realistic possibility.

* * *

RIVER DOLPHIN (RD) AND POLLUTION

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- **Dolphins are the cetaceans. There are five species of river dolphin:**
  1. The Ganges RD (GRD)
  2. The Amazon RD (ARD)
  3. The Indus RD (IRD)
  4. The Yangtze RD (YRD) and
  5. The Franciscana RD (FRD)
  - Out of these the FRD makes its home in salt water an other four species make their home in rivers

Ganges River Dolphin- A Profile
IT IS ENDANGERED NOW
REASONS

- River Pollution.
- Construction of hydel project.
- Killed for their oil & meat.
- Threatened by the destruction of their habitat.
- Depletion of food.
- River barrages.
- Fisheries by catch.
- Construction of embankments, spurs, levees,etc.

Dolphin Expert's Analysis

- The rivers play a key role in biogeochemical cycling. Today the rivers water has polluted due to agricultural run off, Industrial effluents & domestic sewage.
- Environmentalist says that endangered RD and other aquatic creatures in the river under threat due to the hundreds of *Idols* of Goddess Durga & other Hindu deities immersed in the river. The threat is graved because the synthetic materials used in the idols includes paints containing poisonous metal like Cr, Hg, and Pb. Immersions of idols not only increases pollution

levels but also treatens aquatic creatures including Dolphins. (R. K. Sinha, Dolphin Expert)

- According to Gudu Baba, the immersions of hundreds of idols had added around five hundred litres of paint, hundred of Kg of plaster of paris and toxic synthetic material into the river

Dolphin Staus & Hydel Projects

State	No. of Scheme	Installed Capacity (MW)
Arunachal Pradesh	42	27,293
Manipur	03	362
Meghalaya	11	931
Mizoram	03	1500
Nagaland	03	330
Assam	04	687
Total:	66	31,103

WHY IS THIS SPECIES IMPORTANT ?

Presence of dolphin in a river system is a good indicator of healthy ecosystem.

It is at the apex of the aquatic food chain, its presence in adequate numbers symbolizes greater biodiversity in the river system and helps keep the ecosystem balance.

- River dolphin protection committee should be strenghtend.
- The student of the educational institute should be involved in the dolphin conservation programme.
- The people especially the fisher flock should be reminded about wildlife protection act,1972.
- Local census of the dolphin should be carried out periodically
- Mosquito net should be banded forthwith.

- River dolphin should be declared as National aquatic animal.

CONSERVATION APPROACHES

- ➤ The strict legal protection of the dolphin should be more effectively enforced. Harmful fishing practices such as stream poisoning, dynamiting should be prevented.
- ➤ Consideration should be given to establishment of 'Dolphin Sanctuary'.
- ➤ Should be aimed at long term conservation programme.
- ➤ Studied should be carried out to determine the availability of water impoundments as dolphin habitat.
- ➤ Substitute of dolphin oil may be provided.

CONSERVATION APPROACHES

- Setting up of aqua sanctuary in potential areas.
- Development of culture based fisheries in the marginal areas of *beels*
- Implementation of surveillance system for monitoring of health of the water bodies, especially in relation to pesticide pollution.
- Strict implementationof existing environmental and fisheries laws.
- Alarming depletion of RD in Assam has raised concern among international agencies, nature conservationist and NGO's.
- They want to declare the xihus as the second state animal (after rhinoceros) and one of the rare successful conservation story.

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RETHINK ABOUT 'DEEPOR BEEL'

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DeeporBeel (Bil or Beel means "lake" in the local Assamese language), is located to the south-west of Guwahati city, in Kamrup district of Assam, India. It is a permanent freshwater lake, in a former channel of the Brahmaputra River, to the south of the main river. It is also called a wetland under the Ramsar Convention which has listed the lake in November 2002, as a Ramsar Site for undertaking

conservation measures on the basis of its biological and environmental importance.

The name DeeporBeel is stated to be derivative of the Sanskrit word 'Dipa' which means Elephant and the Beel means wetland or large aquatic body in Assamese language, inhabited by elephants.

➢ Flora

The hydrophytic vegetation of the beel has been classified, based on ecological adaptation, into the following categories with their floristic elements. These are:

- Aquatic vegetation ,submerged, emergent and floating vegetation are found during the summer season.
- In deep open water area, marshy lands, mud flat, emergent vegetation, water hyacinth patches, net-grass land patches are reported
- Migratory water-fowl, residential water-fowl and terrestrialavifauna are common in paddy field areas, dry grassland areas and scattered forest areas.

List of aquatic plants identified in the Beel are:

- Eichhorniacrassipes, Pistiastratiotes, Otteliaalismoides, Lemna minor, Potamogetoncrispus, Vallisneriaspiralis, Hydrillaverticillata, Ipomoeareptans, Azollapinnata.

Other lake shore vegetation include:

- Eupatoriumadoratum, Achyranthesaspera, Cyperusesculentus, Phragmiteskarka, Vitextrifolia, Acciumbasilium, Saccharumspontaneum and Imperataarundinacea.

Dominant tree species in the nearby Deciduous forests in the beel basin are species of Tectonagrandis or common teak, Ficusbenghalensis, Shorearobusta and Bombaxmalabaricum

➢ Ava fauna

The Beel is a natural habitat to many varieties of birds. 219 species of birds including more than 70 migratory species are reported in the beel area. Some of the globally threatened species of birds like Spotbilled Pelican (Pelecanusphilippensis), Lesser Adjutant Stork (Leptoptilosjavanicus), Baer's Pochard (Aythyabaeri), Pallas' Sea Eagle (Haliaeetusleucogaster), Greater Adjutant Stork (Leptoptilosdubius) and the Siberian crane (Grusleucogeranus) .

> ## Fauna

Wild Asian Elephants (Elephasmaximus), Leopard, Jungle Cat and the protected Barking Deer, ChinesePorcupine and Sambar are found in the beel

> ## Deterioration of the beel

Natural and anthropogenic causes for the deterioration of the beel are many. The major reasons reported in the beel ecosystem are

- Proliferation of human settlements, roads, and industries around the periphery (in the eastern and north-eastern sides) causing pollution problems
- Waste water from different parts of the city and the adjoining areas
- Construction of broad-gauge railway line on the periphery of the beel
- Brick kilns and soil cutting
- Hunting, trapping and killing of wild birds and mammals
- Unplanned intensive fishing practices (both during day and night)

> ## Restoration activities

A comprehensive management plan has been set in motion and it is proposed to notify the whole beel area as a protected area. The long term measures envisaged to preserve the beel environment are

- Encroachments and settlements around the beel periphery to be eliminated
- Train stops on the boundary of the Beel to be discontinued
- To raise suitable plantations on either side of the railway line to reduce noise level
- Eco-restoration of surrounding forest area
- Guwahati city runoff, which includes sewage, to be treated before discharging into the beel
- Encourage bird related eco-tourism and conservation education.

So, let's join the mission to save our "DEEPOR BEEL"...............

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GOLDENRICE : b-CAROTENE, VITAMIN-A AND OUR HEALTH

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b-Carotene is extremely important to us as it is the most efficient precursor of retinol (vitamin-A), hence it is called pro-vitamin-A. The liver converts b-carotene into vitamin-A, the only way we can get our requirement of vitamin-A. Specific enzymes split one molecule of b-carotene into two molecules of vitamin-A.

Deficiency of vitamin-A causes dry skin, dry eyes, dry mucous surfaces, retarded development and growth, sterility in males and night blindness and other types of irreversible blindness. Every year, at least a million children die weakened by vitamin-A deficiency and about 3,50,000others go blind. Millions of others, young and old, suffer from several disorders related to vitamin-A deficiency (VADs).

Disease Prevention by b-Carotene

In recent times, b-Carotene has been rated high as an antioxidant which scavenges free-radicals, which are believed to be involved in the onset of several disorders, including cardio-vascular disease and certain types of cancer. b-Carotene is being increasingly used as a preventive measure against these diseases.

Our Sources of b-Carotene

The rice plant produces b-carotene in the green tissues but there is none in the starchy endosperm which constitutes 90 per cent of the grain we eat. Most of us get the required amount of b-carotene from supplementary food such as carrots, fruits and leafy vegetables. Several communities, such as the Japanese consume brown sea weeds, which are high in b-carotene.

Throughout the world, the poor do not get enough of b-carotene and hence suffer from vitamin-A deficiency. Vitamin-A deficiency may also be due to certain diseases like measles.

Golden Rice

About a dozen years ago, Gary Toenniessen, Director of Food Security, Rockefeller Foundation, has recognized the lack of b-carotene in polished rice and identified as a worthwhile goal, the transfer of genes for b-carotene synthesis into food grains, particularly rice,using transgenic technology. Such a fine tuned task is beyond the possibilities of traditional plant breeding techniques to achieve.

Potrykus saw a hope for millions of poor children in introducing the gene for b-carotene in the rice itself, which is the staple food. Golden rice is a variety of *Oryza sativa*rice produced through genetic engineering to biosynthesizebeta-carotene, a precursor of pro-vitamin A in the edible parts of rice.The scientific details of the rice were first published in Science in 2000.Golden rice was developed as a fortified food to be used in areas where there is a shortage of dietary vitamin A.In 2005, a team of researchers at biotechnology company, Syngenta produced a variety of golden rice called "Golden Rice 2". They combined the phytoene synthase gene from maize with *crt1* from the original golden rice. Golden rice 2 produces 23 times more carotenoids than golden rice (up to 37 $\mu g/g$), and preferentially accumulates beta-carotene (up to 31 $\mu g/g$ of the 37 $\mu g/g$ of carotenoids).To receive the Recommended Dietary Allowance(RDA), it is estimated that 144 g of the most high-yielding strain would have to be eaten.

A simplified overview of the carotenoid biosynthesis pathway in golden rice

The enzymes expressed in the endosperm of golden rice, shown in red, catalyze the biosynthesis of beta-carotene from geranylgeranyl diphosphate. Beta-carotene is assumed to be converted to retinal and subsequently retinol (vitamin A) in the animal gut.

Golden rice was created by Ingo Potrykus of the Institute of Plant Sciences at the Swiss Federal Institute of Technology, working with Peter Beyer of the University of Freiburg. The project started in 1992, and at the time of publication in 2000, golden rice was considered a significant breakthrough in biotechnology, as the researchers had engineered an entire biosynthetic pathway.

Golden rice was designed to produce beta-carotene, a precursor of vitamin A, in the part of rice that people eat, the endosperm. The rice plant can naturally produce beta-carotene, which is a carotenoid pigment that occurs in the leaves and is involved in photosynthesis. However, the plant does not normally produce the pigment in the endosperm, since photosynthesis does not occur in the endosperm.

Golden rice was created by transforming rice with two beta-carotene biosynthesis genes:

1. *psy* (phytoene synthase) from daffodil (*Narcissus pseudonarcissus*)

2. *crt1* from the soil bacterium *Erwinia uredovora*

(The insertion of a *lyc* (lycopenecyclase) gene was thought to be needed, but further research showed it is already being produced in wild-type rice endosperm.)

The *psy* and *crt1* genes were transformed into the rice nuclear genome and placed under the control of an endosperm-specific promoter, so they are only expressed in the endosperm. The exogenous lyc gene has a transit peptide sequence attached so it is targeted to the plastid, where geranylgeranyl diphosphate formation occurs. The bacterial *crt1* gene was an important inclusion to complete the pathway, since it can catalyze multiple steps in the synthesis of carotenoids, while these steps require more than one enzyme in plants. The end product of the engineered pathway is lycopene, but if the plant accumulated lycopene, the rice would be red. Recent analysis has shown the plant's endogenous enzymes process the lycopene to beta-carotene in the endosperm, giving the rice the distinctive yellow colour for which it is named. The original golden rice was called SGR1, and under greenhouse conditions it produced 1.6 µg/g of carotenoids.

The research that led to golden rice was conducted with the goal of helping children who suffer from vitamin A deficiency(VAD). At the beginning of the 21st century, 124 million people, in 118 countries in Africa and South East Asia, were estimated to be affected by VAD. VAD is responsible for 1–2 million deaths, 500,000 cases of irreversible blindnessand millions of cases of xerophthalmiaannually.Children and pregnant women are at highest risk. Vitamin A is supplemented orally and by injection in areas where the diet is deficient in vitamin A.

Because many children in countries where there is a dietary deficiency in vitamin A rely on rice as a staple food, the genetic modification to make rice produce provitamin A (beta-carotene) is seen as a simple and less expensive alternative to vitamin supplements or an increase in the consumption of green vegetables or animal products. It can be considered as the genetically engineered equivalent of fluoridated water or iodized salt.

Golden Rice Deserves A Chance

Golden Rice is now only a research product and it takes a lot of time and effort to make it available across the counter, particularly in the developing countries, which essentially require it. Neither variety is currently available for human

consumption. Although golden rice was developed as a humanitarian tool, it has met with significant opposition from environmental and anti-globalization activists.Controversial issues can be settled only through relevant experimental data and discussion.

Golden rice and other GM crops are meant to revolutionize agriculture.

Golden Rice signifies a shift in the target of GM crops, from the farmer to the consumer. It has the potential to help millions throughout the developing world. Millions of poor in the developing world need it.   Golden Rice deserves to be given a chance to prove itself or to the contrary. Let us hope that the dust settles soon and the sun shines on Golden Rice.

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AN INTRODUCTION TO NOISE POLLUTION

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What is noise?

- Any sound that affects the physiological and psychological health of a person adversely.
- Human responses to sound may be different for different persons.
- Also, a person may respond to same sound differently at different times.
- Thus, identification of a sound as noise becomes a subjective problem, even though there are some sounds that may be universally regarded as noise.
- The adverse effects of noise on human health can be categorized into the physiological effects and psychological effects.
- Among the physiological effects, noise induced hearing loss (temporary/permanent) is the most common.
- Other adverse physiological effects of noise exposure include :
  - rise in blood pressure level
  - incidence of peptic ulcers
  - complications in pregnancy

- The psychological effects are triggered due to annoyance caused by
    - speech interference
    - sleep disturbance
    - affecting work performance
- This often leads to anxiety which, in turn, affects the physiology by interfering with the hormonal system.
- Thus, tackling noise pollution is important from the view point of human health.

What is sound?

Sound literally means the sensation caused by vibrating wave motion that is perceived by organs of hearing. Physically, sound is a **wave** created by vibrating objects. It travels through the medium as a pressure perturbation by means of particle interaction. Mathematically

$$p(t) = p_o \sin(\omega t - \phi) \qquad \text{[Pa]}$$

where p_0 = amplitude

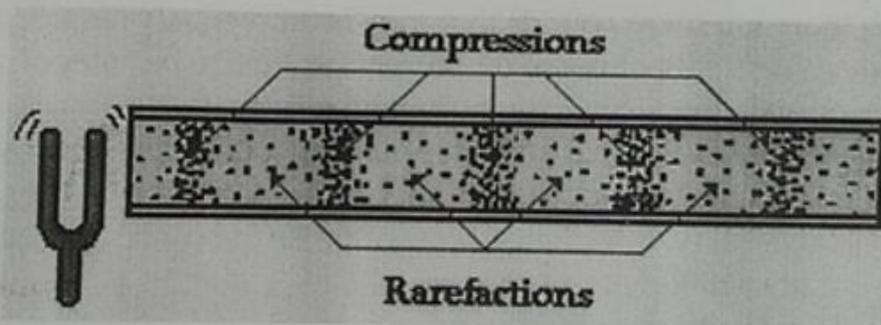$\omega = 2\pi \square f$, angular frequency   [rad/s]

f = frequency   [Hz]

t = time   [s]

ϕ = initial phase

Remember

- Sound is a mechanical wave (not electromagnetic)
- Sound is a longitudinal wave characterized by the to and fro motion of the medium particles.

Compressions

Rarefactions

❑ The speed of sound wave depends upon the properties of the medium.
- The inertial properties
- The elastic properties

Sound is a Pressure Wave

NOTE: "C" stands for compression and "R" stands for rarefaction
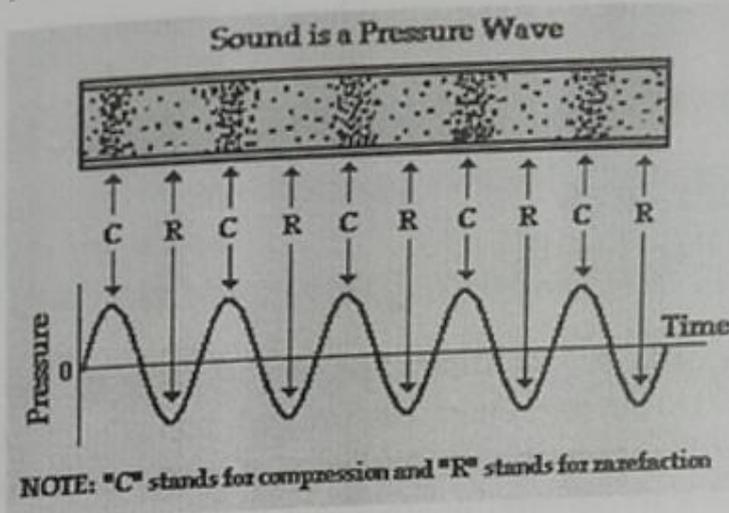
Sound Spectra

❑ An average normal human ear can respond to sound waves in a frequency range of 20 Hz to 20,000 Hz.
❑ Sounds having frequencies less than 20 Hz are called the **infrasonics**
❑ Sounds with frequencies greater than 20,000 Hz are called the **ultrasonics.**
❑ Our ear is not equally sensitive to all the frequencies.
❑ It is less sensitive at the extremes and more sensitive in the middle of the audible range

Sound Pressure level – The Decibel Scale

❑ The range of sound pressures commonly encountered by the human ear is very wide.
❑ The audible sound pressure variations range from about 20 μPa (20×10^{-6} Pa) to 100 Pa.
❑ 20 μPa corresponds to the average person's threshold of hearing.
❑ 100 Pa corresponds to the threshold of pain.
❑ To manage a large range of sound pressures on the linear scale, it has been condensed into a more manageable logarithmic scale by the acoustical scientists.

This has been done by devising the concept of Sound Pressure Level (L_p)

Where,
$$L_p = 10 \log\left(\frac{p}{p_{re}}\right)^2 \quad [dB]$$

p_{re} = international reference sound pressure of 20 μPa which represents the verage threshold of hearing for the normal healthy human ear.

p = root mean square (rms) sound pressure (N/m²)

NOTE: 20 μPa ~ 0 dB
         100 Pa ~ 134 dB

DECIBEL

❑ A decibel (dB) is the logarithm of the ratio of the sound pressure experienced to the reference pressure (which is the threshold of hearing). It is a unit for expressing the intensity of sound on a scale from zero (for the average least perceptible) to about 135 (for the average pain level).

Some Examples

❑ Threshold of hearing — 20 μPa — 0 dB

❑ Normal Conversation — 20,000 μPa — 60 dB

❑ Free way traffic — 2,00,000 μPa — 80 dB

❑ Rock Concert — 20 Pa — 120 dB

❑ Threshold of Pain — 100 Pa — 134 dB

❑ Airplane take off — 200 Pa — 140 dB

Standards of Noise Pollution in India

Area Code	Category of Areas	Day Time L_p	Night Time L_p
A	Industrial Area	75 dB	70 dB
B	Commercial Area	65 dB	55 dB
C	Residential Area	55 dB	45 dB
D	Silence Zone	50 dB	40 dB

Here, day time refers to 6.00 a.m. to 9.00 p.m. while the night time means 9.00 p.m. to 6.00 a.m. Silence zone includes the areas up to 100 meters around certain premises like hospitals, educational institutions and courts.

Noise control

- To control noise, different techniques are used.
- Acoustically absorbing and damping materials can be used in the source to lower the intensity of noise.
- Obstacles/barriers can be introduced in the path between the source and the receiver.
- In the receiving site, ear plugs or separate chambers/cabins can be used for the personnel.

Conclusion

- Noise is harmful. It can cause serious physiological and psychological damages.
- In a recent survey, 80% of traffic police in Pune were found to be deaf. The National Physical Laboratory has found that Delhi, Mumbai and Kolkata are the noisiest cities in the world.
- Even the Election Commission has recognized the harmful effects of noise and banned use of loudspeakers during elections.
- Widespread ill effects of Noise Pollution such as high blood pressure, increased acidity and peptic ulcer formation, deafness, mental agitation and disturbance of sleep generally became known to people in early 1980s.
- Now-a-days, Noise Pollution is considered as a major health hazard.
- We, in India, are exposed not only to noises, common to most countries, but in addition, we have to face misuse of loudspeakers, loud vehicle horns, noisy crackers etc., which are firmly put down in most countries.

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MAGIC NUMBER NUCLEI

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The shell model of the nucleus is an attempt to account the existence of magic numbers. It has been observed that nuclei having either the number of proton Z or the number of neutron $N = A - Z$ equal to one of the numbers 2, 8, 20, 50, 82 and 126 have a very high stability as compared to their neighbours. These numbers are called magic number.

The significance of magic number lies in the fact that the corresponding number of proton or neutron gives a high stability to the nucleus.

Nuclei having both proton number Z and neutron number N equal to one of the magic number 2, 8, 20, 50, 82, and 126 are called doubly magic nuclei.

Again nuclei with 14, 28 and 40 nucleons are slightly less stable but are most stable than the rest. These numbers are called semi-magic numbers.

Mirror Nuclei :

Two nuclei having the same number of nucleons but the no. of protons in one of them being equal to the number of neutrons in the other are called MIRROR NUCLEI. Example – (i) $_1H^3$ and $_2He^3$ (ii) $_6C^{13}$ and $_7N^{13}$ (iii) $_3Li^7$ and $_4Be^7$.

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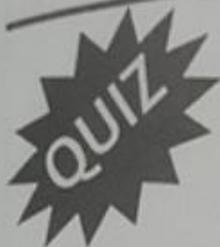
TEST YOUR KNOWLEDGE

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Deptt. of Botany

1. The galaxy we live in is called the Milky Way. It is shaped approximately like:
   A) A round ball
   B) A doughnut
   C) A pretzel
   D) A flat spiral

2. Charles Darwin began developing his theory of evolution while voyaging on a ship named:
   A) The Enterprise
   B) The Beagle
   C) The Santa Maria
   D) The Endeavour

3. What is special about Sirius, the Dog Star?
   A) It is the only star first observed by Albert Einstein
   B) It is the brightest star in the night sky
   C) It always lies directly above the North Pole
   D) It emits staccato barking sounds which radio telescopes can detect

4. The platypus and the echidna are the only mammals that:
   A) Lay eggs
   B) Have green blood
   C) Live in Antarctica
   D) Eat eucalyptus leaves

5. Which was the last continent to be discovered by Europeans?
   A) Antarctica
   B) Greenland
   C) Oceania/Australia
   D) South America

6. Which is the world's smallest ocean?
   A) Antarctic
   B) Arctic
   C) Atlantic
   D) Indian

7. What would you study if you were a speleologist?
   A) Mineral deposits
   B) Trees
   C) Caves
   D) Mountains

8. The tongue has more than
   A) 1000 taste buds
   B) 2000 taste buds
   C) 4000 taste buds
   D) 8000 taste buds

9. Oncology is the diagnosis and treatment of which disease?
   A) Tuberculosis
   B) Kidney Failure
   C) Cancer
   D) Jaundice

10. The most important stimulant in tea leaves is
    A) Caffeine
    B) Brucine
    C) Phenylalanine
    D) Theine

Answers: 1D), 2B), 3B), 4A), 5A), 6A), 7C), 8D), 9C), 10A).

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