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DESERT ENVIRONMENT NEWSLETTER

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ICAR-CAZRI

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From the desk of chairman

It gives me pleasure to place before you the present issue of DEN which begins with phreatophytes. These are deep rooted plants in search of water. It is interesting to know that our ancient literature was replete with examples of such plants. Modern science has yet to confirm many of such claims. In the "Know your Desert Plants" section, an endangered species *Caralluma edulis* has been described in view of its tremendous medicinal importance. While pollution in the air is increasing everywhere, the common man is concerned with its abetment at household level. Therefore, ENVIS team has brought out a list of 15 such reported plants (with their photographs) which can purify polluted air within living rooms and residential areas. Some of them are so common that we should feel encouraged to grow these bounties of nature in our court-yards. Additional information on 'Air Quality Index' and 'Air Pollution Act' increase our knowledge about these aspects as responsible citizens. All other regular columns on some prominent institution in the Desert, Events, Conferences, News items etc. make an interesting reading. Hope this fascinating issue gives you usable information, too. Have a happy reading!

(O.P. Yadav)

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Know Your Desert

Phreatophytes – Plants on the Run for water – Ancient Ideas to Modern Approaches

Adaptation of plants to natural conditions permit them to grow on their specific habitats throughout the world. These may be classified as: (a) Xerophytes (b) Mesophytes (c) Hydrophytes. There is another category of plants called Phreatophytes. The term "phreatophyte" was first used by Meinzer. The word is derived from two Greek words meaning "well plant". He defined it as a plant that habitually obtains water from the zone of saturation, either directly or through the capillary fringe. In the first half of the 20th century plant-hydrologists regularly used such plants as indicators in groundwater prospecting. Phreatophyte grows where precipitation is insufficient for long-term survival and, consequently, it requires groundwater in that specific environment such as arid regions. The spatial and temporal variation in water availability is the main driver of plant development in arid environments. In deserts where water is available in form of short pulses of monsoon the perennial plant species rely on access to water in deep soil layers. To tap this soil water at great depths, desert plants have deep-reaching roots. Nevertheless, the deep root system can only sustain limited above ground biomass. Thus, these plant species are also characterized by a high root: shoot ratio and a high specific root length (SRL), defined as the unit root length per unit mass (mg^{-1}). A high root: shoot ratio and high SRL are particularly important during establishment of desert phreatophytes. As the different phreatophytic species exhibit different realized niches according to different depths to the groundwater table, they might differ in their root growth and their ability to deal with receding water tables in the period of establishment. Plant cover as a geologic and hydro-geologic indicator is also well known since ancient times and in Vedic age several authoritative works were conducted by Hindu Rishis like Saraswat, Manu, Garga and Varahamihira during Gupta period and many ground water indicators were indicated (Table 1). However, present scenario analysis need to be carried out.

Table1. Phreatophytes as confirmed in ancient literature (Source: Gupta, 1965*)

Phreatophytes species	Ground Water Depth (in ft.) as mentioned		
	Saraswat	Manu	Varahamihira
Capparis decidua	60	+	96
Calotropis procera	+	++	+
Datura fastuosa	+	-	90
Prosopis cineraria	+	+	300
Pongamia pinnata	+	18	+
Saccharum munja	+	18	+
Saccharum spontaneum	+	18	+
Salvadora persica	32	+	32-49
Solanum surattense	+	+	21
Vitex negundo	+	++	+
Ziziphus mauritiana	+	+	96

+ Depth not mentioned

++ Mentioned as indicator, but no references to depth indicated

*Source: Gupta, S.C. 1965. Hindus on Ground Water Hydrology. The Nat. Geogr. Journ. 2 (3&4): 174-184

The phreatophytes serve as good indicators of the presence of water. A contact of phreatophytes root system with water, even with the margin of capillary ground water, is an essential condition for their existence in desert. Consequently, independent of the atmospheric precipitation, plants of this group grow and develop very well during the entire year. Throughout their life time, these groups of plants are so dependent on ground water that when its root system

becomes isolated from it, the plants die. Because of the close relationship which exist between the vegetation and the depth at which the ground water is situated (specifically under arid conditions) plant cover and the plant association may be used as an indicator for ground water. Some examples of phreatophytes in the Indian desert are *Salvadora oleoides* (Fig. 1), *Acacia nilotica* (Fig. 2), *Prosopis cineraria* etc. (Fig. 3).

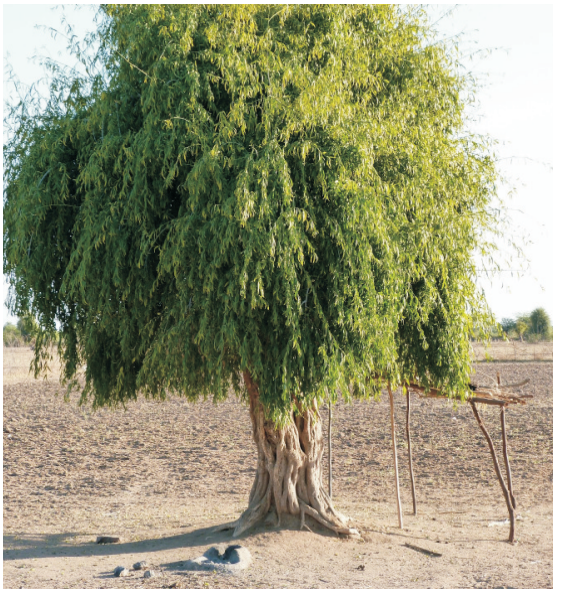

Fig. 1 *Salvadora oleoides* (Mitha Jal)

Our current knowledge suggests that three factors drive above ground vegetation responses to changes in groundwater levels: 1) drought and anoxic stress tolerance.2) changes in the size and distribution of the active root system: and 3) associated changes in the water uptake capacity. In addition, a number of confounding factors may modify vegetation response. These include soil texture, timing and rate of change in groundwater, herbivory, and disease. Finally, climate change may affect precipitation amount and temporal distribution and thus groundwater recharge in these ecosystems. This could further increase conflicts between human consumption and ecosystem requirements. Consequently in depth studies on ecology and hydrology of phreatophytes obviously deserve more attention in desert ecosystems of India.

Fig. 2 *Acacia nilotica* (Desi Babool)

Fig. 3 *Prosopis cineraria* (Khejri)

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Know Your Desert Plants

Caralluma edulis (Edgew.) Benth. et Hook. f. (Asclepiadaceae)

Common Name: Pimpa

Fig. 4 Habit of *C. edulis*

Distribution: The species, *C. edulis* has been reported from Mauritiana, Sudan, Somalia, Saudi Arabia, United Arab Emirates, India and Pakistan. In India, it is restricted to western Rajasthan only.

Botanical Description: It is an erect, succulent, branched, 15–60 cm tall perennial herb preferring sandy habitats along the association of *Panicum turgidum* grass (Fig.4). Stems are much branched and creeping while, stolons are whitish. Erect branches are 4 angled, green with longitudinal grey blotches. Leaves are simple, opposite, small, 6–8 mm long and about 2 mm broad, ovate-lanceolate, sessile, acute and soon caducous. Flowers are 1–3 in the axil of leaves all along distal nodes with 1.0–1.7 cm long, filiform, glabrous, terete pedicels (Fig. 5). Follicles are in pairs, 12–17 cm long, slender, smooth, terete, lanceolate, tapering to a sharp point. Seeds are 7 - 8 mm long, about 3 mm broad, brown, margins winged with 2.5 cm long coma. Flowering and fruiting occurs from February to October and March to May.

Fig. 5 Close up of flower of *C. edulis*

C. edulis is a drought resistant stem succulent occurring in dry sandy places in hot arid areas preferably within the large tussocks of *Panicum turgidum* as a nurse plant. Traditionally, its succulent stems are consumed raw as green vegetable and is also used as medicinal plant of the Thar Desert of India. *C. edulis* is used in promoting appetite, improves digestion and relieves gastric problems. It is also used in treating leprosy and diseases of blood. The whole plant of *C. edulis* is used for treating different disease categories such as parasitic diseases, alzheimer, rheumatism, hypertension, gastric problems, diabetes, febrifuge, leprosy. *C. edulis* has been used as emergency food and appetite suppressor during the times of scarcity in arid regions for centuries. Degradation of rangelands due to high grazing pressure and changes in land use pattern has threatened its existence. Efforts have been made for its *ex-situ* conservation by means of ecological niche modelling, multiplication in nursery and reintroduction in native habitats.

R.N. Kulloli and Suresh Kumar,
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Technological options

A breath of fresh air

Indoor plants are like mini air purifiers which filter and clean the air around us. They absorb carbon dioxide at night and release oxygen during day to incessantly provide humans with natural oxygen.

Some of them are described here:-

1. *Aloe vera* : Aloe, Gwar Patha , Ghrit kumari

This is an easy-to-grow, sun-loving succulent that helps to clear formaldehyde and benzene, which are the by products of chemical-based cleaners, paints and many more. *Aloe vera* is kept in sunlight. It is considered that one pot of aloe is equal to nine biological air cleaners. When harmful elements in the air exceed due amount, spots will appear on the leaves and these are signals of high pollution. Beyond its air-clearing properties, the gel inside the aloe plant can also heal cuts and burns. It is also used for bad skin conditions and to heal wounds, sunburns, burns, abrasions.

2. *Chlorophytum comosum*: Spider Plant

Spider plant has rich foliage and small white flowers. *Chlorophytum* is an air filter itself. It can perform photosynthesis under weak light and absorbs harmful air. One pot of *Chlorophytum* grown in 8-10 square meters of room is enough to perform as an air filter, which releases oxygen and absorbs carcinogens like formaldehyde and styrene. *Chlorophytum* is very strong in absorbing carbon monoxide and formaldehyde normally up 85% - 95%. It decomposes benzene and Nicotine in tobaccos. So they are called green filters. Besides carbon monoxide it also absorbs xylene, a solvent used in the leather, rubber and printing industries. It produces many small plants vegetatively known as "spiders" that are easy to multiply. Spider plants thrive well in cool-to-average home temperatures and prefer dry soil. Bright indirect sunlight keeps them growing best.

3. *Gerbera jamesonii:* Gerbera daisy, African Daisy

This bright, flowering plant is effective in removing trichloroethylene, which is used in dry cleaning of clothes. It also filters out the benzene that comes with inks. Gerberas thrives in well-drained soil, so ensure that pots should have drainage holes. Plants are to be provided with at least six hours direct sunlight every day and watered twice in a week.

4. *Sansevieria trifasciata:* Mother in laws's tongue, Snake plant

Snake plant is best for filtering out formaldehyde, which is common in cleaning products, toilet paper, tissues and personal care products. Pot of snake plant is kept in bathrooms as it thrives well with low light and steamy humid conditions while helping filter out air pollutants.

5. *Scindapsus aures:* Money Plant, Golden pothos

Golden pothos is a powerful plant which filter out formaldehyde from air. This fast-growing plant creates a cascade of green from a hanging basket. It can be grown inside garage because car exhaust is filled with formaldehyde. It needs bright, indirect light to grow.

6. *Chrysanthemum sp.:* Guldavadi

The blooms of *Chrysanthemum* help to filter out benzene, which is commonly found in glue, paint, plastics and detergent. Pots should be kept near an open window with direct sunlight as it requires bright light for flowering. It also acts as mosquito repellent.

7. *Ficus benjamina:* Weeping fig

Weeping fig help us to filter out pollutants that typically come through carpeting and furniture such as formaldehyde, benzene and trichloroethylene. It is a very popular indoor plant, due to its elegant growth and tolerance of poor growing conditions; it does best in bright, sunny conditions but will also tolerate considerable shade. It requires a moderate amount of watering during summers.

8. *Dracaena deremensis:* Dracaena, Warneck dracaena

This Warneck dracaena helps to combat pollutants associated with varnishes and oils. It grows easily inside, even without direct sunlight. With striped leaves forming clusters at the top of thin stem. The dracaena is known for its white stripes along the edges of leaves. If the tip of leaves turns brown, it is the indication of too much fluoride in tap water.

9. *Aglaonema crispum* : Chinese evergreen

This plant helps to filter out a variety of air pollutants and begins to remove more toxins as time and exposure continues. Even with low light, it will produce blooms and red berries. It is one of the easiest indoor plants because it can grow in low light. Since *Aglaonema* species are tropical, they need humid air and occasional misting.

10. *Spathiphyllum sp.*: Peace lily

Peace lily is most important plant among indoor plant as it removes three most common volatile organic compounds (VOCs)- formaldehyde, benzene and trichloroethylene. It can also help in reducing toluene and xylene. The Peace Lily is a compact plant growing up to a height of 3'-2' spread. It prefers indirect sunlight and high humidity. For best results, the Peace Lily should be thoroughly watered.

11. *Monstera deliciosa*: Window leaf, Mexican bread fruit

Monstera improves air quality at night. It is not so good at cleaning the air, but it is really good at absorbing formaldehyde. Besides, it absorbs carbon dioxide at night and releases the oxygen, so it is helpful in improving air quality. It is also good looking and elegant, proves to be a very good indoor plants.

12. *Ficus elastica*: Rubber tree, Rubber fig

Rubber tree is a multi-functional cleaner which eliminates harmful substance. They absorb carbon dioxide, carbon monoxide, etc. They also absorb small, compact dust particles present in the surroundings.

13. Cacti

Cacti are the best in reducing radiation. They are very strong in eliminating bacteria. In tackling pollution, cacti are the best in reducing radiation. Besides, cacti absorb carbon dioxide at night to release oxygen. Putting cacti in the room is helpful in sleeping and supplementing oxygen.

14. *Dypsis lutescens*: Areca Palm, Golden cane palm, Butterfly palm

The Areca Palm is one of the most popular and graceful palms. It is tolerant to indoor environment, releases copious amounts of moisture into the air. Additionally, the areca is consistently rated among the best houseplants for removing all indoor air toxins. It is among the best plants for removing a variety of toxins, especially formaldehyde. It likes bright and indirect light. Because of a high transpiration rate, it adds a lot of humidity to the air and needs to be watered regularly. They grow best in reasonably warm temperatures.

15. *Adiantum sp.*: Maidenhair fern

Adiantum absorbs radiation from computer and printer which emits Xylene and Toluene. It absorbs 20 micrograms of formaldehyde per hour and is considered the most effective natural cleaner.

Compiled from www.en.wikipedia.org/wiki/NASA_clean_air_study

By **Taru Mathur**
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Know Your Institutions

Desert Medicine Research Centre (DMRC)

History

Realizing the importance of research needs of existing and emerging health problems of desert, Indian Council of Medical Research, New Delhi decided to establish a Centre in Rajasthan with a definite mandate to undertake and promote research on health problems specific to desert areas, study the changing patterns of health problems especially in view of various developmental activities taking place in the region and strengthen the scientific and technical expertise of state as well as local health agencies.

The Desert Medicine Research Centre (DMRC), established on 27th June, 1984, started functioning in the form of three co-ordinating units located at Jodhpur (Fig. 6), Bikaner, and Jaipur. The positioning of the three units in three areas of Rajasthan, represented a desert health study unit at Jodhpur, a unit representing desert area with developmental activity (Indira Gandhi Nahar Pariyojna) at Bikaner and a non-desert area represented by the Jaipur unit. A comprehensive baseline health survey in three units was undertaken to have scientifically generated observations on the health profile of the region and factors associated with the morbidity pattern. With the completion of baseline health survey, all the units of the Centre were merged to form a unified research Centre at Jodhpur in the year 1992.

The Centre has several ongoing programmes on dengue, malaria, vector bionomics, insecticide resistance, novel herbs with potential as insecticides as well as anti-infective agents, hypertension, and various nutritional deficiencies in vulnerable populations aiming to establish itself as centre of excellence on these problems with special reference to desert ecology. With its transformation into a research, teaching and training centre (e.g. already recognized for a PhD programme), DMRC has now grown up to undertake opportunities and challenges in human health research with more vigour and enthusiasm to fulfill its overall mandate of the new charter of duties meeting national and international goals in this area.

Current Thrust areas

- To study maintenance mechanism of dengue virus in nature, determine regional risk factors of Dengue & DHF and develop surveillance design capable of forecasting impending epidemic situations for their prevention and management in Rajasthan.
- To study vector bionomics and transmission dynamics of desert malaria, identifying local risk factors to develop a strategic action plan for its prevention and control.
- To study magnitude and distribution of nutritional deficiencies and develop locally sustainable intervention programme for their management.
- To undertake longitudinal studies for estimation of burden of communicable and non- communicable diseases and their transition across time and space for policy planning.
- To study epidemiology of life-style diseases, identify local risk factors and demonstrate intervention measures for their effectiveness.

Achievements

- Baseline survey in the initial phase and subsequent rapid drought survey were undertaken to understand the health problems in the region. Short and long-term malnutrition, anaemia and diet deficient in calories, vitamin-A and vitamin-B complex were found to be common prevalent problems. Information on the occurrence and distribution of vector species and socio-demographic profile were other important outcomes of these surveys. *Culex pseudosvishnui* and *Culex tritaeniorhynchus* vector of JE hitherto considered to be abounding in rice growing areas, were reported for the first time from Rajasthan.
- Camp approach was demonstrated to be a useful approach in tackling the vitamin-A deficiency and health problems of the salt workers.
- Developed expertise, which proved useful for National Guinea-worm Eradication Programme in Rajasthan. One of the DMRC scientist nominated by the ICMR participated as member of National Commission for Guinea-worm Eradication Certification.

- Explained the mechanism of dengue virus retention in nature through demonstration of Trans Ovarial Transmission (TOT) of dengue virus in *Aedes aegypti* up to seven generation under laboratory conditions & dynamics of desert malaria.
- Demonstrated the utility, feasibility and affordability of wet-drilling as well as use of face masks for prevention of silicosis in sand stone quarry workers.
- A compendium on indigenous plant medicines from tribal areas of Rajasthan has been prepared.
- Demonstrated 200 kD protein in mid-gut of mosquitoes refractory to dengue virus.
- Investigated opium addiction associated susceptibility to pulmonary tuberculosis, problem of silico-tuberculosis in stone quarry workers, nutritional deficiencies and associated morbidities, urolithiasis & hypertension in rural areas.

Vision - a prospective stride

Based on the needs and expectations, the centre will use conventional clinical, epidemiological and laboratory methods as well as modern biological tools of genomics, proteomics and bioinformatics to focus on human physiology, geographical genomics nutrition and associated morbidities/diseases, operational research, vector-borne diseases, medicinal and insecticidal plants, infectious diseases & non-communicable diseases. Physiological adaptation of man to desert environment, to standardize physiological variables in desert population, Integration of basic and clinical sciences using modern biotechnological tools, proteomic maps of body fluids in healthy individuals and its alteration under various conditions of physiological stress and diseased state, immuno-modulators & Operational/Behavioral needs are being envisioned as future research programmes.

Fig. 6 Desert Medicine Research Centre, Jodhpur

DMRC has developed linkages with other ICMR research institutes, Indian Council of Agricultural Research (ICAR) and its agencies, regional universities, medical colleges, defence organizations, Council of Scientific and Industrial Research (CSIR), oil and natural gas organizations located in the region. These provide opportunities for amalgamating knowledge in the fields of geography, medicine and health issues, linked with defence-related areas to strategic benefits.

Compiled from www.dmrcjodhpur.nic.in by
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Know Your Policies

Air Prevention and Control of Pollution Act (1981) of India

The Government of India passed this Act in 1981 with an objective to clean up our air by controlling pollution. It states that sources of air pollution such as industry, vehicles, power plants, etc., are not permitted to release particulate matter, lead, carbon monoxide, sulfur dioxide, nitrogen oxide, volatile organic compounds (VOCs) or other toxic substances beyond a prescribed level. This Act is created to take appropriate steps for the preservation of the natural resources of the Earth which among other things includes the preservation of high quality air and ensures controlling the level of air pollution.

The Act specifically empowers State Governments to designate air pollution areas and to prescribe the type of fuel to be used in these designated areas. According to this Act, no person can operate certain types of industries including the asbestos, cement, fertilizer and petroleum industries without consent of the State Board. The Board can predicate its consent upon the fulfillment of certain conditions. The Act apparently adopts an industry wide "best available technology" requirement. As in the Water Act, courts may hear complaints under the Act only at the instigation of, or with the sanction of, the State Board.

To ensure this, Pollution Control Boards (PCBs) have been set up by Government to measure pollution levels in the atmosphere and at certain sources by testing the air. This is measured in parts per million or in milligrams or micrograms per cubic meter. The particulate matter and gases that are released by industry and by cars, buses and two wheelers is measured by using air-sampling equipment. However, the most important aspect is for people themselves to appreciate the dangers of air pollution and reduce their own potential as polluters by seeing that their own vehicles or the industry they work in reduces levels of emissions.

The main objectives of the Act are as follows

(a) To provide for the prevention, control and abatement of air pollution.

(b) To provide for the establishment of Central and State Boards with a view to implement the Act.

c) To confer on the Boards the powers to implement the provisions of the Act and assign to the Boards functions relating to pollution.

Air pollution is more acute in heavily industrialized and urbanized areas, which are also densely populated. The presence of pollution beyond certain limits due to various pollutants discharged through industrial emission is monitored by the PCBs set up in every state.

Powers and Functions of the Boards

Central Pollution Control Board

The main function of the Central Pollution Control Board is to implement legislation created to improve the quality of air and to prevent and control air pollution in the country. The Board advises the Central Government on matters concerning the improvement of air quality and also coordinates activities, provides technical assistance and guidance to State Boards and lays down standards for the quality of air. It collects and disseminates information in respect of matters relating to air pollution and performs functions as prescribed in the Act.

State Pollution Control Boards

The State Boards have the power to advise the State Government on any matter concerning the prevention and control of air pollution. They have the right to inspect at all reasonable times any control equipment, industrial plant, or manufacturing process and give orders to take the necessary steps to control pollution. They are expected to inspect air pollution control areas at intervals or whenever necessary. They are empowered to provide standards for emissions to be laid down for different industrial plants with regard to quantity and composition of emission of air pollutants into the atmosphere.

The State Board may establish or recognize a laboratory to perform this function. The State Governments have been given powers to declare air pollution control areas after consulting with the State Board and also give instructions to ensure standards of emission from automobiles and restriction on use of certain industrial plants.

Penalties:

The persons managing industry are to be penalized if they produce emissions of air pollutants in excess of the standards laid down by the State Board. The Board also makes applications to the court for restraining persons causing air pollution. Whoever contravenes any of the provision of the Act or any order or direction issued is punishable with imprisonment for a term which may extend to three months or with a fine of Rs. 10,000 or with both, and in case of continuing offence with an additional fine which may extend to Rs 5,000 for every day during which such contravention continues after conviction for the first contravention.

Compiled from www.environmentallawsofindia.com

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Knowledge Corner

Air Quality Index

The Air Quality Index (AQI) is an index for reporting daily air quality. It gives an idea about how polluted air is, and its associated health effects. The AQI focuses on health affects which we experience within a few hours or days after breathing polluted air. Environmental Protection Agency (EPA) calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide and nitrogen dioxide. For each of these pollutants EPA has established national air quality standards to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country.

How Does the AQI Work?

AQI ranges from 0 to 500. The higher the AQI value, the greater the level of air pollution and the greater the health concern. For example, an AQI value of 50 represents good air quality with little potential to affect public health, while an AQI value over 300 represents hazardous air quality. An AQI value of 100 generally corresponds to the national air quality standard for the pollutant, which is the level EPA(Environmental Protection Agency) has set to protect public health. AQI values below 100 are generally thought of as satisfactory. When AQI values are above 100, air quality is considered to be unhealthy-at first for certain sensitive groups of people, then for everyone as AQI values get higher.

Understanding the AQI

Air Quality Index helps to understand local air quality and its effect on health. For better understanding, the AQI is divided into six categories.

AQI colors

Each category corresponds to a different level of health concern. The six levels of health concern and what they mean are represented by different colors. EPA has assigned a specific color to each AQI category to make it easier for people to understand quickly whether air pollution is reaching unhealthy levels in their communities. For example, the color orange means that conditions are "unhealthy for sensitive groups," while red means that conditions may be "unhealthy for everyone," and so on (Table. 1).

Table. 2 Air Quality Index and health implications

Air Quality Index Levels of Health Concern	Numerical Value	Meaning	Health Implications
Good	0 – 50	Air quality is considered satisfactory, and air pollution poses little or no risk.	Minimal impact
Moderate	51 –100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.	Responsible minor breathing discomfort to sensitive people
Unhealthy for Sensitive Groups	101 – 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.	It may cause breathing discomfort to people with lung disease such as asthma, and discomfort to people with heart disease, children and older adults

Unhealthy	151-200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.	May cause breathing discomfort to people on prolonged exposure, and discomfort to people with heart disease
Very Unhealthy	201 – 300	Health alert: everyone may experience more serious health effects.	It will cause respiratory impact even on healthy people, and serious health impacts on people with lung/heart disease.
Hazardous	301 – 500	Health warnings of emergency conditions. The entire population is more likely to be affected.	This would trigger health warnings of emergency conditions. The entire population is more likely to be affected

Compiled from www.en.wikipedia.org/wiki/Air_quality_index

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Table. 3 Methods of measurement of different pollutants

Sr. No	Pollutant	Time Weighted Avarage	New Standards (Shedule VII, Rule 3 (3B) 16th Nov 2009 of India		Methods of Measurement
			Concentration in ambient air		
			Industrial Area Residential, Rural & Other Areas	Ecologically sensitive area (Notified by Central Govt.)	
1	Sulphur Dioxide (SO_2)	Annual Avg*	50.0 µg/ m^3	20.0 µg/ m^3	Improved West and Gaeke method, Ultraviolet fluorescence
		24 hours**	80.0 µg/ m^3	80.0 µg/ m^3	
2	Oxides of Nitrogen as NO_2	Annual Avg*	40.0 µg/ m^3	30.0 µg/ m^3	Modified Jocob and Hochheise (Sodium Arsenite), Chemiluminescence
		24 hours**	80.0 µg/ m^3	80.0 µg/ m^3	
3	Particulate matter (size less than 10µm)	Annual Avg*	60.0 µg/ m^3	60.0 µg/ m^3	Gravimetric, TOEM, Beta attenuation
		24 hours**	100.0 µg/ m^3	100.0 µg/ m^3	
4	Particulate matter (size less than 2.5 µm	Annual Avg*	40.0 µg/ m^3	40.0 µg/ m^3	Gravimetric, TOEM, Beta attenuation
		24 hours**	60.0 µg/ m^3	60.0 µg/ m^3	

5	Lead (Pb)	Annual Avg*	0.50 µg/ m^3	0.50 µg/ m^3	AAS/ICP method for sampling on EPM2000, ED-XRF using Teflon filter paper
		24 hours**	1.0 µg/ m^3	1.0 µg/ m^3	
6	Carbon Monoxide (CO)	8 hours**	2.0 mg/ m^3	2.0 mg/ m^3	Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour	4.0 mg/ m^3	4.0 mg/ m^3	
7	Ozone	8 hours**	100.0 µg/ m^3	100.0 µg/ m^3	Photometric, Chemiluminescence, Chemical method
		1Hour	180.0 µg/ m^3	180.0 µg/ m^3	
		24 hours**	60.0 µg/ m^3	60.0 µg/ m^3	
8	Ammonia (NH_3)	Annual Avg*	100.0 µg/ m^3	100.0 µg/ m^3	Chemiluminescence, Indo-Phenol Blue method
		24 hours**	400.0 µg/ m^3	400.0 µg/ m^3	
9	Benzene	Annual Avg*	5.0 µg/ m^3	5.0 µg/ m^3	GC based continuous analyzer, Adsorption/desorption followed by GC Analysis
10	Benzo(a) pyrene	Annual Avg*	25.0 ng/ m^3	25.0 ng/ m^3	Solvent extraction followed by GC/HPLC extraction
11	Arsenic	Annual Avg*	6.0 ng/ m^3	6.0 ng/ m^3	AAS/ICP method for sampling on EPM2000
12	Nickel		20.0 ng/m^3	20.0 ng/ m^3	AAS/ICP method for sampling on EPM2000

Compiled from www.envfor.nic.in

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Events by ENVIS CAZRI

Events Organised by ENVIS-CAZRI

A Guest lecture of Prof. S. R. Yadav, Ex-Head, Dept. of Botany, Shivaji University, Kolhapur was organized. The function was chaired by Dr. O.P. Yadav, Director, CAZRI, Jodhpur. Dr. Suresh Kumar, ENVIS Coordinator welcomed the honourable speaker and introduced him. The programme was attended by around 50 participants including scientists and staff of CAZRI, Jodhpur.

In his lecture, "Implications and importance of newly discovered plants from India" was discussed in great detail by Prof. S. R. Yadav with excellent slides. Prof. Yadav talked about correct identification of wild relatives of some crops like *Vigna sp.* He also explained the importance of taxonomy in the field of agriculture.

Dr. O.P. Yadav, Director also discussed about importance of newly discovered plant species especially wild relatives of crops in agriculture and better sustenance of livelihood. At the end, vote of thanks was presented by Dr. Suresh Kumar.

News

बाजार नहीं, घर पर तैयार पौष्टिक ब्रेड खाएं

बासनी/जोधपुर. आधुनिक जीवन शैली में ब्रेड न खाना संभव नहीं है जिसके दुष्परिणाम भी झेलने पड़ते हैं। लेकिन ब्रेड अगर जौ, बाजरा, गेहूं, चावल, और दाल (मल्टीग्रेन) के साथ मिला कर बनाई जाए तो यह शरीर के लिए किसी एंटीऑक्सीडेंट से कम नहीं होगी। यह एक तरह से रोटी ही है जो घर पर बनाई जा सकती है। दूसरा अगर कोई इसे स्टार्ट अप बिजनेस के तौर पर शुरू करे तो उसमें भी ज्यादा लागत नहीं आएगी।

केंद्रीय शुष्क क्षेत्र अनुसंधान संस्थान (काजरी) ने मल्टी न्यूट्रिएंट से ऐसी ही ब्रेड बनाई है जिसे डायबिटीज के मरीज आसानी से पचा सकेंगे। जिन्हें अक्सर बाजार की ब्रेड खाने से डॉक्टर मना करते हैं। काजरी ने शोध करते हुए नये मॉडल से ब्रेड तैयार की है, इसमें ब्रेड के आटे के मिश्रण में मल्टीग्रेन के साथ पौष्टिकता के लिए फलों का रस और हरे पत्तेदार सब्जियों का चूरा भी मिला दिया। इससे ब्रेड में पोषक तत्वों की मात्रा बढ़ गई। खास तौर पर मधुमेह की बीमारी रिकवरी के दौरान इसकी सबसे बड़ी जरूरत होती है।

साधारण ब्रेड से कैसे अलग

- आयरन, जिंक और एंटीऑक्सीडेंट का मिश्रण
- मैदे की जगह खेतों में उगने वाले धान का ज्यादा प्रयोग
- डायबिटीज के मरीजों के लिए जरूरी पोषक तत्व मौजूद

ऐसे बनाएं घर पर ब्रेड

यह बल्टीयुक्त भटी बैल वाला उपकरण होता है। इसमें ब्रेड का मिश्रण व पानी डालकर इसे बिजली से चलाया जाता है। ब्रेड फुलाने के लिए तीसरा चलाया जाता है। उसके बाद ब्रेड के आटे को डिब्बे में भर कर ढक कर रख दिया जाता है। इसकी भाप से ब्रेड फूल जाती है। ओवन में फूली हुई ब्रेड को पका कर पी हीट किया जाता है। फिर ब्रेड की बेकिंग होने के बाद तत्काल तापमान पर 5-6 घंटा ठंडा कर कटर से काट लिया जाता है।

दही जमाने आसान

इस पर और अनुसंधान चल रहा है। अभी तक तैयार ब्रेड खाने योग्य रही है। ये घर में दही जमाने के समान ही आसान है। इसकी विधि के व्यावसायीकरण होने के बाद इस तकनीक से कोई भी घर पर बना सकता है।

डॉ. प्रतिभा तिवारी हैड, प्रौद्योगिकी हस्तांतरण, काजरी, जोधपुर

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सौर ऊर्जा के लिए किया प्रेरित

आईआईटी व स्कूली विद्यार्थी काजरी के शोध कार्यों से हुए रूबरू

पत्रिका न्यूज़ नेटवर्क
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काजरी में शैक्षणिक भ्रमण के दौरान बाहर से आए विद्यार्थी व अन्य।

बासनी/जोधपुर. ईसान विकास प्रोग्राम के तहत असम, मणिपुर व मेघालय के आईआईटी, नौवीं व दसवीं के छात्र-छात्राओं ने काजरी में मंगलवार को शैक्षणिक भ्रमण किया। इस दौरान उन्हें सौर ऊर्जा तकनीक, वन संपदा और कृषि शिक्षा से जोड़ने के लिए प्रेरित किया गया।

प्रधान वैज्ञानिक डॉ. पी सांतरा ने सौर ऊर्जा के विभिन्न उपयोग, सौर यंत्रों व गर्मी में सब्जियां, दूध व फल आदि ताजा रखने के लिए शीतल कक्ष की तकनीक के बारे में बताया। तकनीकी अधिकारी नारायणराम व तकनीकी सहायक रमेशचन्द्र ने मरु वानस्पतिक उद्यान में विद्यार्थियों को पश्चिमी राजस्थान के बहुउपयोगी औषधीय पौधों अश्वगंधा, शंखपुष्पी, चामकस, वज्रदंती आदि के बारे में बताया। तकनीकी सूचना केन्द्र के तकनीकी अधिकारी गजेसिंह जोधा व सूरजप्रकाश ने फसल और उन्नत बीज के बारे में जानकारी दी।

कृषकों का कौशल बढ़ा कर खेती को लाभकारी बनाएं : डॉ. महापात्रा

भारतीय कृषि अनुसंधान परिषद के डीजी ने किया काजरी में अवलोकन

सिटी रिपोर्टर | जोधपुर

भारतीय कृषि अनुसंधान परिषद, नई दिल्ली के महानिदेशक डॉ. त्रिलोचन महापात्रा ने सोमवार को काजरी में शोध क्षेत्रों का अवलोकन किया। उन्होंने कहा कि काजरी ने प्राकृतिक संसाधनों का प्रबंधन, मरुस्थलीकरण नियंत्रण, वर्षा जल प्रबंधन, चरागा[...] विकास, शुष्क उद्यानिकी, पशुधन प्रबंधन, सौ[...] ऊर्जा के क्षेत्र में अनेक तकनीक विकसित की हैं, ज[...] शुष्क क्षेत्रों के लिए बहुत लाभकारी रही। उनके साथ आईसीएआर के उप-महानिदेशक डॉ. ए अलगुसुंदरम एवं आईसीएआर के अनेक उच्च अधिकारी भी थे। इस अवसर पर महानिदेशक ने वैज्ञानिकों, अधिकारियों व कर्मचारियों को भी संबोधित किया। काजरी निदेशक डॉ. ओपी यादव ने संस्थान की शोध गतिविधियों की जानकारी देते हुए क्षेत्र की भौगोलिक स्थिति की जानकारी दी। इस मौके पर विभागाध्यक्ष डॉ. आरके भट्ट, डॉ. प्रवीण भटनागर, डॉ. आरके जैन, डॉ. एवं मिश्र, डॉ. पीआर मेघवाल, डॉ. एसपीएस तंवर, डॉ. एके शर्मा ने अपने-अपने कार्य क्षेत्र की जानकारी दी

काजरी में कृषि वानिकी के माध्यम से आजीविका पर प्रशिक्षण शुरू

जोधपुर। काजरी में कृषि वानिकी के माध्यम से जलवायु परिवर्तन शमन और अनुकूलन तथा जीवन निर्वहन विषय पर आईसीएआर नई [दि]ल्ली द्वारा प्रायोजित इक्कीस दिवसीय ग्रीष्मकालीन प्रशिक्षण बुधवार से आरम्भ हुआ। कृषि विश्वविद्यालय के पूर्व कुलपति डॉ. एलएन हर्ष ने [बत]ाया कि प्रशिक्षण में प्रतिभागियों [को] 49 विषय विशेषज्ञों द्वारा [व्या]ख्यान दिये जावेंगे। प्रशिक्षण [सं]योजक एवं वरिष्ठ वैज्ञानिक डॉ. [...]के गौड़ ने कहा कि थार रेगिस्तान [में] कृषि वानिकी अकाल के समय [खा]द्यान्न सुरक्षा के रूप में कई [...] उपयुक्त सिद्ध हुई है। उन्होंने [बत]ाया कि प्रतिभागियों को शोध [क्षेत्रों] का भ्रमण एवं गांवों में खेती [की] विभिन्न पद्धतियों, सामाजिक, [आ]र्थिक, संस्कृति से रूबरू करवाया जायेगा उन्होंने बताया कि प्रशिक्षण में गुजरात, पंजाब, पश्चिमी बंगाल, जम्मू-कश्मीर, मध्य प्रदेश, [उत्त]रप्रदेश, राजस्थान, तमिलनाडु, केरल कृषि विश्वविद्यालयों के प्रोफेसर भाग ले रहे हैं।

[नवी]नतम तकनीकियों को गांव, ढाणी तक बढ़ाना होगा

[...] शुभारंभ अवसर पर भारतीय कृषि अनुसंधान परिषद नई दिल्ली के उप महानिदेशक शिक्षा एवं कार्यक्रम के मुख्य अतिथि डॉ. एनएस राठौड़ [ने] कहा कि जलवायु परिवर्तन हो रहा है, ऐसे में कृषि से उत्पादन बढ़ाने के लिए नवीनतम तकनीकियों को गांव, ढाणी तक बढ़ावा देना होगा। [कृ]षि शिक्षा को बढ़ावा देने, किसानों की खेती में कार्यकुशलता बढ़ाने की जरूरत है। कृषि वानिकी की तकनीकों का प्रयोग करके सत्त उत्पादन [सु]निश्चित किया जा सकता है। इससे प्रति इकाई अधिक उत्पादकता के साथ प्राकृतिक संसाधनों का टिकाऊ प्रबन्धन भी होगा। दालों की मांग [की] पूर्ति के लिए दलहनी फसलों के उत्पादन को बढ़ाने के लिए परियोजनाएं चल रही हैं। रोजगार के लिए फलों, सब्जियों एवं अन्य उत्पादों में [मूल्]य संवर्द्धन एवं खाद्य प्रसंस्करण को बढ़ावा देना होगा। कृषि में शिक्षा को प्रोत्साहन के लिए विश्वविद्यालयों को सहयोग प्रदान किया जा रहा [है।] उन्होंने वैज्ञानिकों से आह्वान किया कि देश के हर क्षेत्र में खेती से उत्पादन बढ़ाने के लिए कार्य करें। हर्ष ने कहा कि काजरी ने कृषि वानिकी [पद्ध]ति के अनेक मॉडल विकसित किये, जिनकेउपयोग को बढ़ाने की जरूरत है। पाठ्यक्रम निदेशक एवं विभागाध्यक्ष डॉ. सीबी पाण्डे ने कहा [कि] कृषि वानिकी द्वारा प्राकृतिक संसाधनों का संरक्षणकर, गांवों में हरियाली, पर्यावरण, कृषि विकास बढ़ेगा, रोजगार मिलेगा। राजस्थान में ऐसे [अ]नेकों बहुउपयोगी पेड़ हैं, जिनसे बहुमूल्य उत्पादन प्राप्त होते हैं।

काजरी के शोध कार्यों से रूबरू हुए विद्यार्थी

जोधपुर। ईसान विकास प्रोग्राम के तहत आसाम, मणीपुर, मेघालय के आईआईटी नौवीं एवं दसवीं के छात्र-छात्राओं ने काजरी में मंगलवार को शैक्षणिक भ्रमण किया। प्रधान वैज्ञानिक डॉ. पी सांतरा ने सौर ऊर्जा प्रांगण में सौर ऊर्जा के विभिन्न उपयोग एवं सौर यंत्रों एवं गर्मी में सब्जियों, दूध, फलों आदि को ताजा रखने के लिए शीतल कक्ष के बारे में जानकारी दी। उन्होंने बताया कि सौर ऊर्जा व राष्ट्रीय सौर मिशन के बारे में और भविष्य में सौर आधारित तकनीक विकसित करने के लिए प्रेरित किया। तकनीकी अधिकारी नारायणराम व तकनीकी सहायक रमेशचन्द्र ने मरू वानस्पतिक उद्यान में विद्यार्थियों को बताया कि पश्चिमी राजस्थान में अनेक बहुउपयोगी औषधीय वनस्पतियां हैं, जो पहाड़ों, वनों, बंजर भूमि में सर्वाधिक हैं। इन पौधों से जीवनदायीनी दवाएं बनती हैं। उन्होंने अश्वगंधा, शंख पुष्पी, चामकस, वज्रदन्ती, अस्थमाबेल, शतावर, अडूसा, सर्पगंधा, हरसिंगार आदि पौधों के बारे में जानकारी दी। संस्थान के शोध क्षेत्रों एवं संग्राहलय में सूचना एवं प्रचार अधिकारी बहादुर सिंह सांखला एवं तकनीकी सहायक रमेशचन्द्र ने जल संग्रहण, फलदार पौधों, बहुउपयोगी पेड़ों, झाड़ियों, छायादार वृक्षों के बारे में जानकारी दी। सिंह ने कहा कि पर्यावरण, जल, पृथ्वी को स्वच्छ रख कर ही जीवन को सुरक्षित एवं स्वस्थ रखा जा सकता है। प्रकृति के नियमों का भलीभांति पालन करें तो संसार में कभी भी मूलभूत आवश्यकताओं की कमी नहीं होगी।

राजस्थान पत्रिका XPOSE SUNCITY PLUS
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उत्पादन व गुणवत्ता में अव्वल साबित हुई 'जैविक' खेती

नवाचार : काजरी ने जैविक कृषि तकनीक मॉडल से कम उत्पादन की मिथक तोड़ 8 सालों के रिसर्च से पाई सफलता

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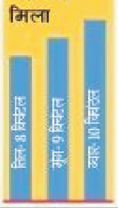
बासनी/जोधपुर. केंद्रीय शुष्क क्षेत्र अनुसंधान संस्थान (काजरी) ने 8 साल रिसर्च कर उस भ्रांति को तोड़ दिया, जिसमें अधिकतर किसान जैविक खेती के उत्पादन को रासायनिक खेती से कम मान कर उसे नहीं अपनाते थे। काजरी में एक सीजन में जैविक खेती से 2 हेक्टेयर क्षेत्र में मूंग और तिल की पैदावार 8 से 10 क्विंटल तक प्राप्त की है, जो रासायनिक खेती के बराबर और गुणवत्ता में उससे आगे है। काजरी में वर्ष 2008 से आदर्श जैविक फार्म की शुरुआत की गई। काजरी निदेशक डॉ. ओपी यादव ने कहा कि इस फार्म में अच्छी कम्पोस्ट खाद, फसल चक्र एवं समय पर प्रकृति मित्र कीट नियंत्रकों का प्रयोग कर के तिल, मूंग, जीरा, बाजरा, ईसबगोल आदि फसलों की जैविक तकनीक विकसित की है। वर्तमान में जैविक फसलों का औसत उत्पादन रासायनिक खेती के उत्पादन के बराबर मिल रहा है।

काजरी के कृषि फार्म में लहलहाती जैविक मूंग की फसल।

8 वर्षों के रिसर्च से मिला



मिट्टी को उपजाऊ बनाने में सहायक

विभागाध्यक्ष डॉ. प्रवीण कुमार ने कहा कि जैविक मॉडल के प्रयोगों से यह सामने आया कि जलवायु के उतार-चढ़ाव (परिवर्तन) की स्थितियों में भी जैविक खेती, अन्य पद्धतियों के मुकाबले अधिक टिकाऊ है। मृदा स्वास्थ्य को बनाने में सहायक है।

जैविक खेती की जरूरत क्यों?

भारत के लगभग 12 प्रतिशत भू-भाग में 400 मिली औसत वार्षिक वर्षा वाले शुष्क क्षेत्र राजस्थान, गुजरात, हरियाणा में बाजरा, ग्वार, मोठ, तिल, जीरा, ईसबगोल व मसाले वाली फसलों का उत्पादन होता है। इन फसलों की जैविक विधि से उत्पादन प्रमाणित होने पर अंतरराष्ट्रीय बाजार में मांग बढ़ेगी।

> यूरोप व अमेरिका में फाइटोसैनेटरी कानून सख्त होने पर भविष्य में रसायनयुक्त उत्पाद का निर्यात बंद होने से शुष्क क्षेत्रों की फसलों का जैविक विधि से उत्पादन करना होगा, जिससे स्थानीय संसाधनों का सदुपयोग होगा।
>
> - डॉ. एके शर्मा, वरिष्ठ वैज्ञानिक, काजरी।

पत्रिका Fri, 02 September 2016 epaper.patrika.com/c/12990875

New Databases of Rajasthan at CAZRI-ENVIS Website

- Trends of rural and urban population in various districts of Rajasthan.
- Trends of livestock population in various districts of Rajasthan.

Compiled & Uploaded by : **Taru Mathur,** IT Assistant, ENVIS, ICAR-CAZRI, Jodhpur

Conferences

Date	Topic	Place
International		
25-27th July, 2016	5th Earth Science and Climate Change Conference,	Bangkok, Thailand
1-10th September, 2016	IUCN World Congress: Planet at the crossroads	Hawaii, USA
19-23rd September, 2016	European Ecosystem Services Conference	University of Antwerp, Belgium
National		
22-24th September, 2016	Impact of Climate Change on Biodiversity: Applications of Recent Technologies for Conservation of Threatened Species	Mizoram University, Aizwal
23-25th September, 2016	International Conference on Occupational and Environmental Health (ICOEH-2016)	New, Delhi