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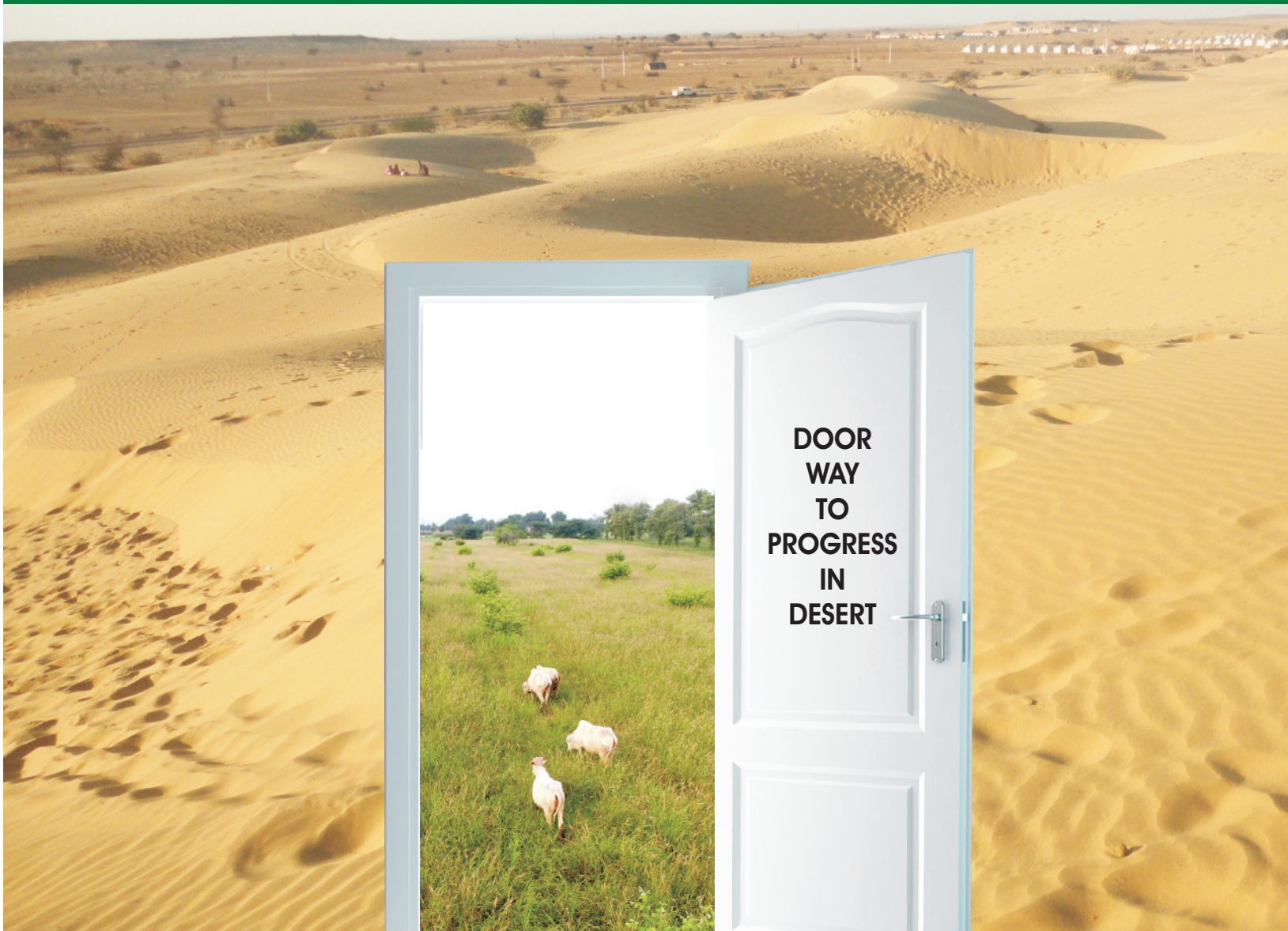
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DESERT ENVIRONMENT NEWSLETTER

ENVIS Centre on Combating Desertification
ICAR-CAZRI

In this issue :

- From the Desk of Chairman
- Know Your Desert- Declining Ground water table-A serious threat for the future of Arid Zone
- Know Your Desert plant- *Glossonema varians*
- Technological Options-Agricultural Disaster Management in Hot Arid Zone
- Know Your Institutions- Ground Water Department, Jodhpur, Rajasthan
- Knowledge Corner-Drinking Water Standards
- Events
- Conferences
- News



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From the desk of chairman

“Bin Pani Sab Soon” says an old Rajasthani adage which means everything is barren and desolate without water. In all Vedic scriptures, water is also recognised as one of the five fundamental constituents of all life on the earth. Truly so, but water assumes much more importance in deserts than in any other part of the earth. This issue of Desert Environment Newsletter therefore touches upon various issues related to water. A detailed account of declining ground water table and its contamination by industrial effluents in Rajasthan should ring the alarm bells. In the knowledge corner is given drinking water standards. Drought, dust storms, heat waves, cold waves and flash floods are regular agricultural disasters and hence their mitigation and management find a place in our feature “Technological options”. Ground Water Department of Government of Rajasthan has been playing a pivotal role in prospecting, developing and planning of water and its contributions are summarized in “Know Your Institutions”. A rare plant, *Glossonema varians* is also detailed besides regular columns on “Events” and “Conferences”.



Hope this issue is liked by you all.

(O.P. Yadav)

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Know Your Desert

Know your Desert: Declining Groundwater Table: A Serious Threat for the Future of Arid Zone

Ground water plays a major role in life support to mankind and is the major source to meet the domestic, irrigation and industrial demands. It is available in wide range of rock types and usually requires little or no treatment; therefore often cheapest and simplest source of water supply. The agriculture sector in India accounts for more than 85% of the total water use for irrigation. Ground water meets 51 percent of the irrigation potential in India through more than 4 million dug wells, 5 million shallow tube wells and around 90,000 public tube wells. Historically, groundwater abstraction from shallow aquifers has been limited mainly because of limitation of water lifting devices. However, a substantial increase in groundwater has been observed after 1950's due to increased number of wells and energized pumps capable of much discharge. The rapid development of groundwater resources resulted in fast decline of water table in most parts of India.

Depletion of groundwater is becoming the major problem in western and peninsular India and in most of the urban areas across Asia. Overuse of the groundwater resource is depleting water tables resulting the drilling of ever-deeper wells and an ever-increasing cost of tapping those aquifers in Gujarat and Rajasthan States. The number of tube wells has been increased tremendously over past 4 decades. The overall well (all types) density (per 1000 km²) for the state of Rajasthan has increased from 1489 in the year 1953 to 3944 in the year 1999. The situation is very alarming in western arid part of state where well density has increased from 3435 to 13850 (including 2893 deep tubewells) for the same period leading to wide spread decline in groundwater levels (Fig.1). Due to over mining, groundwater levels are declining in 9 districts out of 12 districts of arid Rajasthan since 1984. The three exceptions are namely Bikaner, Ganganagar and Hanumangarh districts which show a rising trend of groundwater table in some parts due to over irrigation from Indira Gandhi Nahar Pariyojana. The causes of groundwater depletion are linked with population growth, economic expansion, decline in groundwater recharge and over-abstraction caused by the rapid increase in the number of wells and tube wells and the progress in pumping technologies.

Over-exploitation of groundwater resources not only depletes the reserve but also deteriorates the quality of groundwater and poses a potential threat to the freshwater in maintaining demand and supply. The natural chemical composition of groundwater is influenced predominantly by type & depth of soils and subsurface geological formations through which groundwater passes. Groundwater quality is also influenced by contribution from the atmosphere and surface water bodies. Groundwater contains a wide variety of dissolved inorganic chemical constituents in various concentrations, resulting from chemical and biochemical interactions between water and the geological materials. Inorganic contaminants including salinity, chloride, fluoride, nitrate, iron and arsenic are important in determining the suitability of groundwater for drinking and other purposes. Generally the groundwater quality of western arid Rajasthan is poor (brackish to saline) at deeper levels. High concentrations of some water quality parameters such as salinity, chloride, fluoride, iron, arsenic and nitrate have been observed in many parts of western Rajasthan. About 80 per cent of groundwater has salinity more than 2.2 dS m⁻¹. Fluoride is an endemic problem to the groundwater of this region. Recent case studies indicate that about 95% of sites of this region contain a higher fluoride level in groundwater than the maximum permissible limit as decided by the Bureau of Indian Standards. The presence of fluoride-bearing minerals in host rocks and their interaction with water is considered to be the main cause for fluoride presence in groundwater.

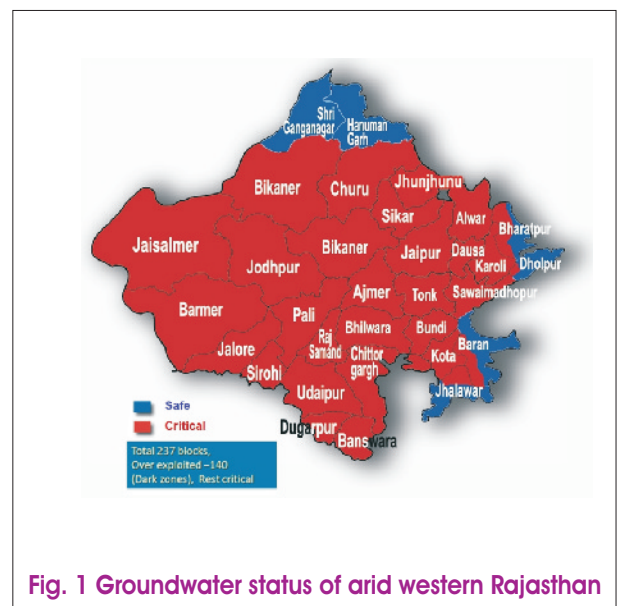


Fig. 1 Groundwater status of arid western Rajasthan

Quality of groundwater is also influenced by anthropogenic factors. Excessive use of fertilizers and pesticides in agriculture and improper disposal of urban/industrial waste are also causing towards contamination of groundwater resources. Agrochemicals in the soil can move from the surface when they are dissolved in runoff water or when they percolate down through the soil. Those that have infiltrated the soil will eventually reach groundwater. High concentration

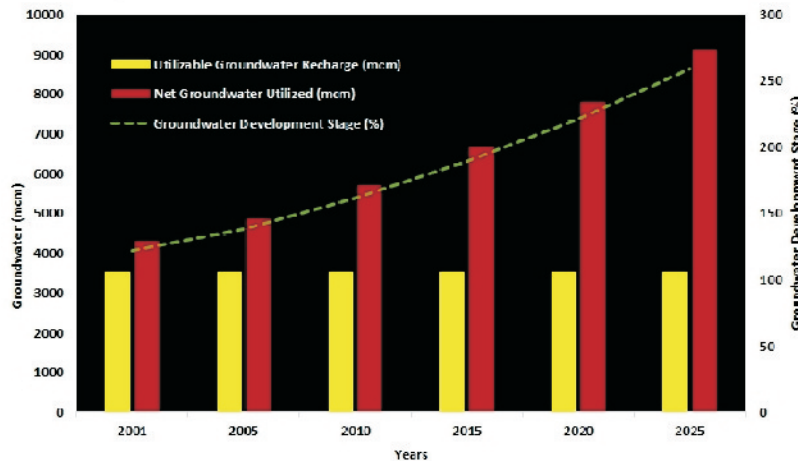


Fig. 2 Projected groundwater scenario of arid western Rajasthan

The unscientific and inefficient use of groundwater is contributing to its increasing scarcity as reflected in steep decline of water levels and under certain situations in sharp deterioration in quality as well. The two major uses of water are drinking and irrigation, which shows avoidable losses. About 10-11 percent of the water is used for drinking. Losses in public distribution system for drinking water are in the order of 30-40 per cent. About 83 per cent of the water is used for irrigation (Fig. 2). Of this, 65 per cent is surface water; losses in surface water irrigation are much higher as compared to those in ground water irrigation. Thus, about two-thirds of the water used for irrigation is affected due to inefficiency. With efficient irrigation techniques like drip and sprinkler the stress on groundwater resources can be reduced.

OPPORTUNITIES

Artificial Recharge

Various experiments and constructions of artificial recharge structures in many projects showed that it would be possible to recharge groundwater under different hydrogeological conditions through structures like check dams, sub-surface dykes, gabion, percolation tanks and injection wells. It is evident that artificial recharge is going to be one of the important planning necessities for times to come. Groundwater aquifer offers feasible alternative to store additional quantity of water available as surplus monsoon runoff. Subsurface storage has some other advantages like little evaporation, widely distributed, operational efficiency and available on demand compared to surface storage of water

in reservoirs. However, subsurface storage also has limitations like slow recharge rate, possible groundwater contamination and also involve cost of extraction but potential benefits are more than surface storage of water in reservoirs. Percolation tanks, pondage in stock tanks with infiltration galleries, sand filled dam, anicuts across the stream, sub-surface barriers etc. are used for groundwater recharge. Adoption of conservation measures like anicuts, loose stone check dams, brush wood check dam etc. in watershed area has resulted in recharge/increase of ground water level @ 0.33-0.75 m year⁻¹. In another watershed at Osian-Bigmi (1991-96), conservation measures like loose stone check dams, vegetative barriers and anicuts resulted in rise in water table by 1.1 m indicating the effectiveness of conservation measures for the recharge of ground water. Sub-surface barrier constructed across ephemeral streams traps sub-surface flow to recharge groundwater aquifer. Construction of two sub-surface barrier of 10 m length each within 300 m from water supply well was found enough to store runoff water required for a village having a population of 500. It is reported that soil conservation practices have increased recharge to an extent of 14.02 to 19.52 % of rainfall in Udaipur region.

Flash Flood Management

It is estimated that in the last 20 years nearly 30.3 billion cubic metres of static groundwater reserve has been exploited in Indian arid zone of Rajasthan which is difficult to be filled in with natural recharge processes. However, there is scope to rejuvenate up to some extent the depleted aquifer during flash flood years. Analysis of long term rainfall data and water balance studies have shown that flash floods with frequency of occurrence once in ten years may generate 2100 – 6200 x 10⁶ m³ excess water. If this excess water is managed to recharge the groundwater, a part of the depleted aquifers may be recouped. The recent flood of year 2006 in various parts of western Rajasthan about 800 villages were inundated. The volume of inundated water in village Kawas were estimated to be 86.4 million cubic meters (mcm) whereas in another village Malwa estimated volume of flood water was 28.8 mcm. Recharge of flood water to groundwater will not only recuperate the groundwater reserve for many years but will also provide relief on surface conditions. Bilara limestone, Lathi and Jodhpur sandstone and alluvium aquifers covering large area in the region are most suitable for groundwater recharge.

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Know Your Desert Plants

Rare and Endemic Desert Plant: *Glossonema varians* (Stocks) Benth.

Glossonema varians belonging to the family Asclepiadaceae is commonly known as 'Khiroli'. Worldwide *Glossonema* species are distributed in Arabia, Bharin Island, Iran, Pakistan (Sindh, Baluchistan) and India (Rajasthan). In India it is represented by single species *G. varians* which is restricted to sand covered impeded rocky areas of western Rajasthan.

Taxonomic Characters: It is small, much branched erect herb occurring in sandy areas of Jaisalmer district. It forms perennial root stock deep in sand. Stem is terete and woody at the base (Fig. 3). Leaves are rotund, ovate-elliptic and acuminate in shape, thick, fleshy and pubescent on both surfaces. Leaves are with long pubescent petioles and crisped margin. Flowers are fragrant with lemon-yellow color Inflorescence is umbellate with 2-8 flowers. Corolla is glabrous, oblong, obtuse. Pollen masses are pendulous and attached in pairs to the pollen carrier by short caudicles. Style apex is truncate and fleshy. Fruits are follicles, long, ellipsoid, beaked and covered with soft, minute spine like processes (Fig.4). Seeds are ovate, flattened with thin membranous margin and sinuate-dentate at the broader end.

Economic Importance: The follicles are known as Khiroli and are eaten raw and rarely sold in the market. Fruit juice is used in cough and throat infections by local people. Due to over exploitation, it now stands threatened. Hence, Government of India has initiated steps for its *in-situ* and *ex-situ* conservation.



Fig. 3 Habit of *Glossonema varians*



Fig. 4 Follicle of *Glossonema varians*

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Technological options

Technological options: Agricultural Disaster Management in Hot arid Zone

1. Drought as Disaster

The arid western Rajasthan is prone to frequent occurrence of drought due to low and erratic nature of rainfall. Detailed analysis on drought in arid Rajasthan during the period 1901-2012 revealed the occurrence of drought once in three to four years. Jaisalmer district in western Rajasthan is most prone to drought, which occurs almost in alternate years. During 1901-2012, the agricultural drought in the region occurred in 70% of the years, out of which drought in 43% years was of severe in nature and in 27% years moderate, thus drought affects considerably the crop and fodder production in this region.

1.1 Management of crops under drought

Best bet strategies include area allocation under different crops and their varieties as per climatic and social considerations, improved cropping systems and sequences, introduction of new crops etc. which if properly dovetailed with suitable management practices can help to mitigate the adverse effect of droughts and weather aberration. Also with the use of weather advisory services provided by India Meteorological Department (IMD), the crop planning and management practices can further be refined and timely implemented to combat drought.

1.1.1 Contingency crop planning

The normal date of sowing rains (> 25 mm week⁻¹) in western Rajasthan are between 1st to 15th July but the onset of monsoon in the region is very erratic. Therefore, the selection of crops and their proportion will depend on varied Agro-ecological situations (AES) and other socio-economic factors, for example, if the onset of monsoon is timely the diversification of crops is recommended in the ratio 4:3:2:1 pearl millet, pulses, cluster bean and sesame respectively in the situations of 300 to 400 mm rainfall having light to medium textured soils. However, the crop diversification should be adopted with suitable crop varieties (short and medium duration) and recommended production technology. The anticipated monsoon is divided into four periods i.e. 20-25th July, 26-31st July, 1-6th August and 7 - 15th August and a contingency plan is drawn. The approach is to sow short duration pulses/cereals/oilseeds and also to produce fodder, which will receive priority in case of further delay of monsoon.

Contingency operation	Possible period of monsoon arrival			
	20-25 July	26 - 31 July	1 - 6 August	7 - 15 August
Field preparation	Field bunding, removal of bushes and harrowing across the slope			
Crop & varieties	Green gram(RMG 62, RMG 268, RMG 344, SML 668, GM 4)	Moth bean (CZM-2, RMO 40, RMO 225, RMO 257, RMO 435)	Moth bean (CZM-2, RMO 40, RMO 257, RMO 435)	Moth bean (CZM-2, RMO 40, RMO 435)
	Moth bean (RMO 40, RMO 257, RMO 435, CZM 2)	Clusterbean (RGC 936, RGC 1002, RGM 112, RGC 1003, RGC 1017))	Clusterbean (RGC 936, RGC 1002, RGM 112, RGC 1003)	Clusterbean for fodder (RGC 936, RGC 1017)
	Cluster bean (RGC 936, RGC 1002, RGC 1017, RGC 1003, RGM 112)	Greengram (RMG 62, RMG 268, RMG 344, SML 668, GM-4)	-	-

	Cowpea (RC 19, RS-9, C-152, RS-9, C-152, V-16, JC-5, JC-10)	Pearlmillet for fodder (Raj 171, MH 169) with cowpea (Bundel Lobia-1, UPC 9202, IC421, FS68)	Pearlmillet for fodder (Raj 171, MH 169) with cowpea (Charodi-1, Bundel Lobia-1, UPC 9202, IC421)	Pearlmillet for fodder (Raj 171, MH 169) with cowpea (Bundel Lobia-1, UPC 9202, IC421)
	Sesamum (RT 46, RT 125, RT127, RT 346 with moth bean/ mung bean in inter cropping system in 2:2 ratio)	Sesamum RT46 with moth bean as mixed crop		
	Pearlmillet, extra-early to early maturing varieties (HHB 67, HHB 67-2, ICMH 356, RHB 121, RCB-2, GHB 538)	Pearl millet for fodder (Raj 171, MH 169) with Mothbean (RMO 40, RMO 257, RMO 435, CZM 2)	Pearlmillet for fodder (Raj 171, MH 169) with Mothbean (RMO 40, RMO 257, RMO 435, CZM 2)	
	Inter cropping Pearl millet (HHB 67, HHB 67(+), ICMH 356, RHB 121, GHB 538) with Greengram (RMG 62, RMG 268, RMG 435)			
Pre-treatment of seeds for drought resistance and crop growth	<ul style="list-style-type: none"> Soak the seeds in potassium nitrate or common salt (7.5-10 g per 10 L water or 1.5-2 tea spoon per 10 L water) at night for 2 hours, then dry it for 2-3 hours, before sowing Thiourea, if available, @5g per 10 L water, or 1 tea spoon in 10 L water for 2 hours; then dry for 2-3 hours before sowing. 			
Sowing	<ul style="list-style-type: none"> In furrows at 60 cm row to row spacing for grains and broadcasting for fodder 			
Seed rate	Normal rate	Increase seed rate by 10-15% of normal (fodder crop)	Increase seed rate by 10-15% of normal (fodder crop)	Increase seed rate by 10-15% of normal (fodder crop)
Fertilizer	For Green gram, Moth bean and Cowpea Basal N:P (10:20 kg/ha)	For Green gram, Moth bean and Cowpea Basal N:P (10:20 kg/ha)	For Green gram, Moth bean and cowpea No fertilizer	For Green gram, Moth bean and cowpea No fertilizer
	For pearl millet Basal (20 kg N/ha); top dressing (20 kg N/ha) depending upon rain	For pearl millet No basal; top dressing (15-20 kg N/ha)	For pearl millet No basal; top dressing (15-20 kg N/ha)	For pearl millet No fertilizer
Insect pest and disease management	<ul style="list-style-type: none"> Seed treatment of Greengram, Moth bean and Cowpea seeds with 2 carbendazim @2g/kg seed to check dry root rot or seed treatment with <i>Trichoderma</i> culture @ 4 g per kg of seeds. Clusterbean seeds should be soaked in 0.025% Streptocycline solution (1 g in 4 litre water) for 2 hours to check bacterial blight. To check termite attack, Chloropyrophos 1.5% dust should be mixed in soil @ 25 kg per hectare at the time of sowing for all crops. 			

1.1.2 Mid-season corrections for crops already sown

Long dry spell after sowing causes poor germination and death of seedlings. Under such situations field should be kept free from weeds and dust or vegetative mulch should be applied. Besides, if rains commence, transplanting of pearl millet can also be done. Mid season drought occurs when there is a long dry spell for consecutive 2 weeks rainless (>2.5 mm) period or more either at vegetative or reproductive stage. Following measures are recommended:

- Timely weed control and interculture operations.
- Mulching/ crust breaking.
- Reduction of plant population - removal of alternate rows (originally spaced at 30 cm) in case of drought
- Spray of thiourea at 500ppm
- Proper plant protection measures
- Lifesaving irrigation to the crop as per availability and stage of crop

1.1.3. Impact of drought on livestock; mitigation and adaptation

During droughts, supply of fodder becomes limited giving less nutrition thus declining production from livestock. Therefore, drought mitigation strategies are centralized around ensuring survival of livestock by minimizing the loss of productivity and lives by optimizing available resources, by following feeding strategies for : 1) maintenance of animals to ensure its survival; 2) having minimum level of production and growth; 3) desired production by purchasing supplements from outside.

Critical body weight for survival will be up to 20% of body weight loss in case of cattle, while in case of desert animals (sheep and camel) it may be up to 30 to 40%. In case of milch and other producing animals, the only solution lies with supplementation because productivity loss cannot be recovered by any other means.

- Optimization of feeding practices for efficient use of scarce resources becomes essential. Emphasis on green fodder conservation becomes important. However, in the face of unpreparedness, appropriate feed enrichment and supplementation strategies become more imperative. Choice of supplements is critical. Feed ingredients bearing high energy/ protein are preferred with minerals. Lack of green fodder causes vitamin deficiency (particularly Vit. A & E), therefore, supplementation becomes essential.
- Supplementary feeding of grains/oil cakes twice a week is needed. Use of grain as supplement for animals is hard to justify because of scarce availability and long-time storage problem, hence, other sources of improved concentrate feeds for draught animals include fodder trees and urea-treated straw (4% urea with Molasses). Wherever possible, by-products such as oil seed cake should be used, if available at reasonable price. Partially damaged / discarded wheat / other grains may be diverted for feeding to productive animals.
- Urea molasses enrichment of straw can be done using 1.00 quintal straw, sprinkled with 20 Litre water containing 10 kg molasses, 1 kg urea, 500 gm mineral mixture, 50 g Brivita (Vitamin A, D3 and E) and 1 kg salt for supplementing the feeding of affected the animals economically. If molasses is not available, ground grain can be mixed @ 1.5 kg per 10 kg urea enriched straw.
- Urea Mineral Molasses Block (UMMB) can be effectively utilized as a combined source of protein, energy and mineral during drought situations. UMMB also help in preventing loss of fertility in case of prolonged drought. These blocks can be easily transported over long distances.
- Grazing of poisonous plants and resulting toxicity problems become more common in the absence of quality fodder. Awareness in farmers is essential, especially with regard to anti-nutritional / toxic factors as nitrate/ nitrite and HCN poisoning.
- In available fallow lands, with any rainfall, farmers should grow short duration drought tolerant arid type crops like pearl millet (Bajra, Sorghum PC6 and MP Chari) and legumes (Moong, Moth, Cowpea BL1 and BL2) as fodder and fodder grasses (like Cenchrus ciliaris, Andropogan etc.). In the following Rabi season, similar crop of Chinese cabbage can be grown, which has low water requirements and provides fodder during early winter months following low monsoon rainfall.

The important management practices, which are to be adopted during drought condition, are:

- Animal should not be kept in direct sunlight. They should be tied under a tree or in a shed. Open and partly shaded housing may be preferred over tying animals inside the sheds. There should be no overcrowding of animals in shed and animals should be provided proper ventilation. If the roof of the animal shed is of iron sheet it should also be covered with thatch or asbestos sheet to cool the ambience. Upper layer of Katchha floor should be replaced with new sand in every six month so that load of organism can be reduced. Pakka floor should be properly cleaned.
- They should be allowed to graze only in early morning or late evening. Feeding should be done during early morning and in the late evening, as animal's water requirement will decrease.
- With drought come many diseases including Foot and Mouth disease, Hemorrhagic septicemia, Black Quarter, anthrax, Enterotoxaemia, Ring worm, Ascariasis, Tick infestation and mange, etc. To control and prevent these diseases, regular vaccination and deworming schedule should be followed.
- During drought there is heavy mortality in animals due to heat stroke, dehydration, infectious and non-infectious diseases. As infected animals may spread the diseases to other animals, hence proper disposal of the carcass is essential by burying or burning.
- Awareness must be created, to prevent animals from eating poisonous toxic material.

1.1.2 Long-term strategies for drought mitigation

- Rain water harvesting and its recycling through sprinklers/drips for sustainable crop production.
- Development of common property resources viz., grazing lands, orans, nadis etc. and their efficient management to reduce animal pressure on arable crops.
- Land use planning on watershed/Index catchment/Khadin basis with inclusion of arable crops, grasses, multipurpose tree species and animals in farming system mode. The systems could be agri-horticulture with ber and gonda; agro-forestry with *Prosopis cinearia*, *Tecomella undulata*, *Acacia senegal*; silvi-pasture (grasses viz. *Cenchrus ciliaris*, *Lasiurus indicus* and fodder shrubs & trees viz. *Ziziphus nummularia*, *Hardwickia binnata*, *Z. rotundifolia*) etc. for sustainable agriculture production which is also conducive for drought management in annual crops.
- To evolve drought resistant and high yielding varieties of cereals, legumes, oil seeds and fodder crops.
- To popularize cultivation of drought hardy and highly remunerative traditional medicinal and high value plants like Guggal, Asvagandha, Shatawari, Tumba, Sonamukhi etc. as new crop introductions for increased income and better drought sustainability of arable lands.
- Development of suitable infra-structure for marketing of value added products made out of crop biomass to help generate alternative income opportunities to the farmers.
- Harnessing of solar and wind energy for utilization in agriculture.

1.2 Management plan for Arid fruit crops under drought

Sensitive fruit species are Ber, Pomegranate, Karonda, Kinnow mandarin, Lime etc. These should be managed by 1) reducing the size of tree canopies by hedging and pruning; 2) severe pruning to reduce tree canopies in case of ber; 3) organic/inorganic mulching of tree basin; 4) watering through drip system; 5) nutrient management through foliar spray/ferti-drip system and 6) anti-transpirant spray to reduce transpiration loss.

2. Dust/wind storms as disaster

- Wind or dust storms occur during April onwards till August when strong winds of 15 to 18 km h⁻¹ accentuate blown sand accumulation process. Occasionally, peak wind of 60-80 km h⁻¹ cause damages like uprooting of shallow trees and shrubs, sand blasts causing crop loss by abrasion actions and most importantly, sand deposits on the roads, railway lines and over other infrastructures.
- Preventive actions include sand dune stabilization, wind breaks, shelterbelts, fence line plantation, reduced or no tillage, lay farming with grass/ legumes, growing taller crops (Pearl millet, castor) to protect shorter crops (moth besn, moong bean, cluster bean, cucurbits, suitable cropping patterns).

3. Heat waves as disaster

Managing sensitive fruit species (Lasora, Citrus spp., Aonla, Bael) under heat wave include: 1) white washing of the lower bare trunk portion of trees during April and again in June-July; 2) providing temporary shelter belt or shade net screen towards wind direction; 3) wrapping of bare trunk with gunny bags or some other farm waste materials and 4) increasing the frequency of irrigation.

4. Cold waves as disaster

Managing Sensitive fruit species (Aonla, Bael, Lasora, Ber) under cold waves includes: 1) training to low headed tree; 2) bordeaux pasting of tree trunk; 3) wrapping of bare trunk with gunny bags or some other farm waste materials; 4) smoking with burning of heaps of dry grass, leaves or farm waste when frost is threatened or imminent; 5) irrigating the orchard frequently during cold spell period and 6) installing wind machine for violent movement of wind which helps to keep away the frost.

5. Flash floods as disaster

- Sandy terrain, very deep sandy soils and shallow river channels that fail to accommodate higher volume of runoffs during flash floods as well as obstruction in the path of some old river channels make arid zone vulnerable to this disaster.
- Some of the preventive measures include: 1) an information fact sheet about the vulnerability of flood prone areas; 2) clearing flood pathways for immediate withdrawal of flood water; 3) evacuation of low lying areas like interdune depression areas in desert regions from habitants or industries (as it happened at Kawas and Malwa); 4) facilitating road connectivity and 5) along with humans, taking steps for the upkeep of livestock with food/fodder stock. A prior knowledge of the area and terrain is essential as the first step to mitigation or preventing more damages.

Besides, regular information on the state of flood flow using all possible information system (communication systems, remote sensing and media) can reduce the damages and loss.

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काजरी में अन्तर्राष्ट्रीय जैव विविधता दिवस मनाया

नवज्योति/जोधपुर।

काजरी में केंद्रीय वन, पर्यावरण एवं जलवायु परिवर्तन मंत्रालय के मरू प्रसार रोक पर्यावरण सूचना केन्द्र द्वारा अन्तर्राष्ट्रीय जैव विविधता मनाया गया। कार्यक्रम के मुख्य अतिथि, कृषि विश्वविद्यालय कुलपति प्रो. बलराज सिंह ने कहा कि मौसम में बदलाव आ रहा है। मरू प्रदेश में चुनौतियां हैं। जीवन कठोर है, तो समाधान भी है। इस क्षेत्र में जैव विविधता प्रचुर मात्रा में है, जिसका संरक्षण एवं उपयोग कर जीवन एवं पर्यावरण को समृद्ध एवं सशक्त बनाये रखा जा सकता है। मरू क्षेत्र की जैव विविधता के आधार पर बहुत सारे उत्पाद आज मार्केट में उपलब्ध हैं, जिस पर क्षेत्र आधारित विशिष्ट गुणवत्ता के आधार पर बौद्धिक सम्पदा भौगोलिक संकेत ह्रासिल की जा सकती है। उन्होंने नागौरी बेल, नागौरी मैथी, मथानिया मिर्ची, ग्वारपाठा, अश्वगंधा, सोजत मेहन्दी,



गुग्गल, काचरा, तुम्बा, मतीरे की विशेषगुणवत्ता के बारे चर्चा की। उन्होंने कहा कि काजरी ने वनस्पति, अनाज, फल, घास पेड़-पौधों आदि पर शोध कर क्षेत्र में हरियाली एवं समृद्धि फैलायी है, जिसके कारण, रोजगार बढ़ा, जीवनयापन के साधन बढ़े।

काजरी निदेशक डॉ. ओ.पी. यादव ने कहा कि जैव विविधता को बचाने के लिए स्थानीय प्रजातियों को उगाया जाये। उन्होंने बायोफार्मिंग एवं समुदायिक

अभयारण बनाने का सुझाव दिया, जिसमें आस-पास के स्थानीय माहौल में पाई जाने वाली जैव विविधता का गांव स्तर तक संरक्षित हो। उन्होंने कहा कि बाजरा, मूंग, मोट जो कि सदियों से यहां उगाया जा रहा है वह जैव विविधता का भण्डार है। उन्होंने समेकित कृषि प्रणाली को अपनाने पर बल दिया। मरू प्रसार रोक पर्यावरण सूचना केन्द्र प्रभारी

डॉ. सुरेशकुमार एवं वरिष्ठ वैज्ञानिक डॉ. दीपक रसाहा ने बताया कि काजरी एनविस की साइट पर मरू प्रदेश के कृषि, जल संसाधन, और मौसम, पशुधन संबंधी आंकड़े एवं उनका आंकलन भी उपलब्ध है, जिसका उपयोगी शोधार्थी अपने विभिन्न परियोजना, कार्यक्रम में कर सकते हैं। उन्होंने कहा कि जैव विविधता को बौद्धिक सम्पदा के साथ जोड़ना भी अहम है।

माचिया पार्क में काजरी की पदयात्रा आज

जोधपुर। काजरी में केंद्रीय वन एवं पर्यावरण मंत्रालय के मरू प्रसार रोक केन्द्र की ओर से मनाये जा रहे विश्व पर्यावरण दिवस सप्ताह कार्यक्रम के तहत पर्यावरण संरक्षण एवं जागरूकता की अलख जमाने के लिए गुरुवार सुबह माचिया बायोलोजिकल पार्क में पद यात्रा होगी। केन्द्र प्रभारी डॉ. सुरेशकुमार व दीपक रसाहा ने बताया कि शुक्रेवार को काजरी रहेजा पुरतकालय में भारतीय रेगिस्तान में वन्य जीवों के संरक्षण विषय पर कक्षा 8 से 10 वीं के विद्यार्थियों के लिए निबन्ध प्रतियोगिता होगी।

Know Your Institutions

Ground Water Department, Jodhpur, Rajasthan

In order to solve the problem of water for irrigation and drinking, Ministry of Food and Irrigation, Government of India established "Rajasthan-Bhu-Garbh- Mandal" for exploration and exploitation of ground water in 1949. In the beginning, the head quarter of the Mandal was at Jaipur, which was later shifted to Jodhpur in 1951. The Mandal started functioning under one Administrative officer with only one Rotary drilling rig and one percussion rig. In 1955 the Government of India handed over the management of the Mandal to the Government of Rajasthan which made it a full-fledged Government Department from an autonomous organization to be known as Ground Water Department. In 1956, the department had 33 Compressors, 5 Percussion rigs, one Rotary drilling rig, one welding set, 14 trucks, 7 jeeps, 2 mobile workshops, 2 blasting units, one water tanker, one lathe machine and one drill machine. Presently the Department has 3 Heavy Duty imported drilling rigs along with one indigenous rig for drilling of tube-wells. These rigs have dexterity of drilling to 350 m in hard and compact rocks. For scientific exploration, entire state was divided in 12 blocks for survey and Research by engineering, scientific and technical staff.

The important work completed in seventies by the Ground Water Department was deepening of wells by blasting in the tribal habitats of districts Dungarpur and Banswara. For augmenting water supply to Jodhpur city from Ransi gaon, for Bhilawara from Kankroliya Ghati, for Barmer from Bhadkha, for Udaipur from Jhamar kotra, for Nagaur from Khivnwsar-Khajwana, for Jaipur city from locally available ground water pockets, for Jaisalmer from Chandan and Lathi and similarly for other districts, suitable locations for drilling of tube-wells were scientifically identified and drilling units constructed successful tube-wells which became mile stone in the development of the state. Through Centrally Sponsored Scheme (CSS), the Department evaluated different scientific parameters through pumping test, provided them to the Planners which were used for the benefits of the public. Experimental tube-wells were constructed under this scheme in shallow and deep aquifers and different parameters viz. Specific yield and Safe Distances between two water extraction units were calculated.

In 1980 decade, under ARC in selected Panchayat Samiti, assuming each Panchayat Samiti as a unit, detailed investigations were done, reports were prepared and submitted to NABARD. Based on these reports, standards were fixed by NABARD, for sanctioning of loans for construction of wells/tube-wells and other agricultural needs.

In 1984, for proper Ground Water evaluation, identified Ground Water Monitoring Stations (DKW) and started regular monitoring on this network. First time in 1984 Ground Water Assessment Report was prepared on Ground Water Estimation Committee Guidelines (GEC Guidelines). Thereafter, regular monitoring was done and such valuable data were compiled that no other state in India had done it before. Based on GEC Guidelines, ground water assessment report was prepared from time to time which was used by state Planners from time to time in formulation of schemes. Brief outcomes of ground water assessment reports prepared for Rajasthan State are presented in Table 2.

Table. 2 Year wise ground water resources in Rajasthan (1984-2009)*

Year	Annual Ground Water Resources			Stage of Development (%)
	Recharge (mcm)	Draft (mcm)	Balance (mcm)	
1984	13790	4927	8863	36
1985	10967	5465	5502	50
1990	10801	5821	4981	56
1992	9850	4714	5135	48
1995	11028	6494	4535	59
1998	12602	8708	3894	69
2001	11159	11635	-476	104
2004	10383	12991	-2609	125
2008	10563	14570	-4007	138
2009	10791	14519	-3728	135

*Source-Ground Water Department, Jodhpur

In 1981-82, Drilling & Hand pump division of Public Health and Engineering Department (PHED) was carved out of Ground Water Department. Ground Water Department contributed to in the Green Revolution of the state through investigation and exploitation of ground water in desert and hilly terrain. The Department extracted ground water for development of every corner of the state but due to astounding exploitation of ground water and habit of wasting water brought ground water to a level of grave concern. In 2009, stage of ground water development was 35 % more than actual ground water recharge. In fact, ground water withdrawal more than actual annual recharge started from year 2001. People started using the STATIC GROUND WATER RESERVE from 2001. According to 2009 report, only 31 blocks were in safe category and 166 block in Over Exploited Category, whereas in 1984 only 12 blocks were Over Exploited and 203 blocks were safe. Thus, from 1984 to 2009, we have brought the situation of ground water to everyone's concern (Table 3).

Table. 3 Year wise categorization of blocks in terms of ground water situation*

Year	Stage of Ground Water Development (%)	Number of Blocks in Category				
		Safe	Semi-Critical	Critical	Over-Exploited	Total
1984	35.73	203	10	11	12	236
1990	53.89	148	31	13	44	236
1992	47.87	149	19	15	53	236
1995	58.88	127	35	14	60	236
1998	69.10	135	34	26	41	236
2001	104.26	49	21	18	86	236
2004	125.13	32	14	50	140	236
2007	132.09	31	13	39	153	236
2008	137.94	30	8	34	164	236
2009	135.54	31	16	25	166	238

*Source-Ground Water Department, Jodhpur

The work of Aquifer mapping undertaken by the Department, loaded on the web, will enable public to manage and utilize ground water, available in their areas. The department undertook the study of artificial recharge to ground water through people's participation in three pilot areas of the state viz., Osian- Mandor in Jodhpur, Khamnor in Rajsamand and Piprali in Sikar districts. Research Design & Development (RD&D) wing of the Department conducted the study to re-construct the probable course of the lost Vedic River, Saraswati in the area of Jaisalmer, starting from Langtala-Ghotaru-Longewala-Tanot-Kishangarh-Dharmikho, under Rajiv Gandhi Drinking Water Mission. Geophysical and Hydrogeological studies, supported with exploratory drillings were done to delineate the probable course. Pollution study was also conducted by RD&D in the river courses adjacent to Balotra of district Barmer, Pali and district Jodhpur where industrial affluent is discharged, polluting nearby ground water.

Ground Water Department now has Mechanical Engineers, Hydro-geologists, Geophysicists, Chemists, Hydro-meteorologist and skilled Technical staff for handling drilling and blasting work. Facilities also includes well equipped Central Workshop to repair drilling rigs and vehicles, Central Store for procurement of materials/spares, Chemical Laboratory for analysis of water samples, Geophysical Laboratory for maintenance and repair of sophisticated geophysical instruments and Data Storage and Processing Cell (DSPC) for processing and storage of all the Hydrogeological and Geophysical data. Other assets are, 7481 nos. of District Key Wells including 2168 nos. of Piezometers, 4 Heavy Duty DTH rigs, 27 Rotary Drilling Rigs, 9 Hand Pump Drilling Rigs and 30 Blasting units. Facilities also exist for Geophysical Survey, Very Low Frequency (VLF) equipments, suitable for hard rock areas and Deep Penetration Resistivity Meters for surveying in desert and deep water table conditions and Electric Loggers for assessing quality of water and designing of pipe assembly in drilled tube-wells.

Thus, Ground Water Department has been effectively contributing in appraisal, development and planning of ground water resources of Rajasthan.

Source- Ground Water Department

Website:<http://gwd.rajasthan.gov.in>

Compiled by - ENVIS Team

ICAR-CAZRI, Jodhpur

Knowledge Corner

Drinking water standards

Sl. No.	Substance or Characteristic	Requirement (Desirable Limit)	Undesirable Effect Outside the desirable Limit	Permissible Limit	Remarks
Essential Characteristics					
i.	Colour, Hasen Units	5	Above 5 consumer acceptance decreases	25	Extended to 25 only if toxic substances are not suspected in absence of alternate sources
ii.	Odor	Un-objectionable	-	-	Test cold and when heated and test of several dilutions
iii.	Taste	Agreeable	-	-	Taste only after safety is established
iv.	Turbidity NTU	5	Above 5 consumer acceptance decreases	10	-
v.	pH value	6.5-8.5	Affects mucous membrane	None	-
vi.	Total Hardness (as CaCO ₃) mg/l	300	Encrustation affects domestic use	600	-
vii.	Iron (as Fe) mg/l	0.3	Affects domestic uses, water supply structures, and promotes iron bacteria	1.0	-
viii.	Chlorides (as Cl) mg/l	250	Affects taste, corrosion and palatability	1000	-
ix.	Residual free chlorine, mg/l	0.2	-	-	Tested at consumer end (Min. 0.3 mg/l. to prevent viral infection)
Desirable Characteristics					
x.	Dissolved solids mg/l	500	Beyond this palatability decreases, causes gastro intestinal irritation	2000	-
xi.	Calcium (as Ca) mg/l	75	Encrustation affects domestic use	200	-
xii.	Magnesium (as Mg) mg/l	30	Encrustation affects domestic use	100	-
xiii.	Copper (as Cu) mg/l	0.05	Astringent taste, discoloration and corrosion of pipes, fitting and utensils beyond this	1.5	-
xiv.	Manganese (as Mn) mg/l	0.1	Taste/appearance affected, affects domestic uses and water supply structures	0.3	-
xv.	Sulphate (as SO ₄) mg/l	200	Gastro intestinal irritation	400	Mg should not exceed 30
xvi.	Nitrate (as NO ₃) mg/l	45	Methaemoglobinemia	100	-
xvii.	Fluoride (as F) mg/l	1.0	May cause fluorosis	1.5	-
xviii.	Phenolic compounds (as C ₆ H ₅ OH) mg/l	0.001	Taste and odour objectionable	0.002	-
xix.	Mercury (as Hg) mg/l	0.001	The water becomes toxic	No relaxation	To be tested when pollution is suspected
xx.	Cadmium (as Cd) mg/l	0.01			
xxi.	Selenium (as Se) mg/l	0.01			
xxii.	Arsenic (as As) mg/l	0.05			
xxiii.	Cyanide (as CN) mg/l	0.05			

Events by ENVIS CAZRI

Events Organised by ENVIS CAZRI

Date	Event	Chief Guest	Topic of lecture	Summary
23 rd May, 2016	International Day for Biological Diversity	Prof. Balraj Singh, Vice Chancellor of Agricultural University, Jodhpur	Desert Biodiversity in Sustainable Livelihoods	Prof. Balraj Singh, stressed the importance of the conservation of arid zone biodiversity (local vegetation, crops, livestock, fodder, grasses etc.) and systems like agro-forestry and animal husbandry in a holistic way by linking the conservation with commercialization.
4 th June, 2016	World Environment Day	Dr. G. S. Bhardwaj, Chief Conservative Forest (Wild Life), Jodhpur	Wildlife Trade	Dr. G. S. Bhardwaj discussed about the importance of the wild life, threats to wild life due to illegal trading and quantum of illegal trade which is really alarming.
17 th June, 2016	World Day to Combat Desertification (WDCD)	Dr. P. Santra, Sr. Scientist (Soil Physics), CAZRI, Jodhpur	Wind Erosion and Desertification	Dr. Santra gave an excellent exposition of dynamics of the wind erosion, its impacts, possible control measures as well as future lines of work and its relevance in agriculture.

Other Events:

- 9th June, 2016- An Environment Walk was organised in the Machia Biological Park, Jodhpur
- 10th June, 2016- An essay competition for the school children was organized on the topic of **"Wildlife Conservation in Indian Desert"**

Conferences

Date	Topic	Place
International		
27-30, June, 2016	United Nations/Kenya Conference on Space Technology and Applications for Wildlife Management and Protecting Biodiversity	Nairobi, Kenya
25-27, July, 2016	5 th International Conference on Earth Science & Climate Change	Thailand
29 Aug.-1 Sep., 2016	5 th International Eco-summit Ecological Sustainability Engineering Change.	France
National		
29-30, July, 2016	National Conference on "Designing Bioactive surfaces with Bacteriophage"	Guru Nanak Technical Institutions, Hyderabad
19-20 Aug., 2016	National Conference on "Recent Advances in Green nanotechnology"	Bahra University, Solan

News

देश में कृषि शिक्षा का स्ट्रॉन्ग नेटवर्क : डॉ. यादव

काजरी में आयोजित निबंध प्रतियोगिता में स्टूडेंट्स ने दिखाई प्रतिभा



विश्व पर्यावरण सप्ताह के तहत आयोजित निबंध प्रतियोगिता में कई स्कूलों के बच्चों ने भाग लिया।

जोधपुर। काजरी में केंद्रीय वन एवं जलवायु परिवर्तन मंत्रालय के मरु प्रसार रोक केंद्र की ओर से मनाए जा रहे विश्व पर्यावरण सप्ताह कार्यक्रम के तहत भारतीय रेगिस्तान में वन्यजीवों के संरक्षण विषय पर आयोजित निबंध प्रतियोगिता में कक्षा 8 से 10वीं के विद्यार्थियों ने अपनी प्रतिभा दिखाई। काजरी निदेशक डॉ. ओपी यादव ने कहा

कि देश में कृषि शिक्षा के क्षेत्र में स्ट्रॉन्ग नेटवर्क है। उन्होंने देश में मौजूद कृषि शिक्षा विश्वविद्यालयों, संस्थानों एवं कृषि शिक्षा के महत्व के बारे में जानकारी दी। उन्होंने आह्वान किया कि वीएससी एपीकलचर व एपीकलचर इंजीनियरिंग में शिक्षा लेकर अपने करियर को नई दिशा दें। एनक्स के प्रभारी डॉ. सुरेश कुमार व डॉ. दीपकर साहा ने एनक्स केंद्र की

गतिविधियों पर प्रकाश डाला। उन्होंने पर्यावरण संरक्षण एवं संवर्द्धन करने तथा शहर, गांव को प्रदूषण से बचाए रखने एवं अधिक से अधिक हरियाली फैलाने व पेड़ों को बचाने का संदेश दिया। वरिष्ठ तकनीकी अधिकारी तीर्थदास ने धन्यवाद ज्ञापित किया। निबंध प्रतियोगिता में कई स्कूलों के करीब 50 छात्र-छात्राओं ने भाग लिया।

‘मरुस्थलीकरण नियंत्रण गंभीर चुनौती’

विश्व मरुस्थलीकरण दिवस पर काजरी में मरु प्रसार रोक पर हुआ मंथन

नवज्योति जोधपुर। काजरी स्थित केंद्रीय वन एवं जलवायु परिवर्तन मंत्रालय के मरु प्रसार रोक केंद्र की ओर से विश्व मरुस्थलीकरण दिवस पर आयोजित कार्यक्रम में वक्ताओं ने मंथन किया। इस अवसर पर वरिष्ठ वैज्ञानिक डॉ. पी सांनरा को स्मृति चिन्ह देकर सम्मानित किया गया। मुख्य वक्ता डॉ. सांनरा ने वायु कटाव एवं मरुस्थलीकरण

विजली पैदा होगी।

काजरी वैश्विक स्तर पर अग्र अन्वेषक

काजरी निदेशक डॉ. ओपी यादव ने कहा कि मरुस्थलीकरण नियंत्रण गंभीर चुनौती है। संस्थान ने मरुस्थल को रोकने, हरा-भरा करने, संसाधनों के संरक्षण करने, बाहिरों के जीवन स्तर को ऊंचा उठाने का बोझ उठाना तथा अनेक



विषय पर व्याख्यान दिया। उन्होंने कहा कि वायु कटाव पूरे पारिस्थितिक तंत्र को असंतुलित कर देता है। उन्होंने बताया कि खेत के दक्षिण, पश्चिम दिशा में पेड़-पौधों की रक्षा पट्टी विकसित करें, मिट्टी का कटाव नहीं होगा, पानी खेत के रुकेगा, पैदावार अच्छी होगी। उन्होंने तेज हवा, आंधी के लिए पूर्व चेतावनी प्रणाली विकसित करने की आवश्यकता जताई। काजरी मैकेनिकल बैरियर विकसित करने पर शोध कार्य कर रही है, जिससे वायु कटाव पर नियंत्रण होगा तथा तेज हवा की गति से

महत्वपूर्ण एवं उपयोगी तकनीक विकसित की है, जिसके कारण वैश्विक स्तर संस्थान अग्र अन्वेषक के रूप जाना जाता है। शुष्क क्षेत्रों के विकास के लिए राष्ट्रीय एवं अंतरराष्ट्रीय स्तर की कई बड़ी योजनाओं को बनाने, कार्यान्वित करने में वैज्ञानिकों ने मार्गदर्शन एवं योगदान दिया है। कार्यक्रम में आकरी, बीएसआई, आरआरएससी, डीएमआरसी, काजरी के वैज्ञानिकों ने भाग लिया तथा चर्चा की। एनक्स केन्द्र प्रभारी डॉ. सुरेशकुमार ने केन्द्र की गतिविधियों के बारे में बताया। कार्यक्रम का संचालन वरिष्ठ वैज्ञानिक डॉ. दीपक रसाहा ने किया तथा वरिष्ठ तकनीकी अधिकारी तीर्थदास ने आभार व्यक्त किया।

माचिया पार्क में हरियाली व वन्यजीवों का विचरण खुशहाली का प्रतीक : डॉ. यादव

विश्व पर्यावरण सप्ताह के तहत माचिया पार्क तक की पढ्यात्रा



जोधपुर। भारत सरकार के केंद्रीय वन एवं जलवायु परिवर्तन मंत्रालय के मरु प्रसार रोक केंद्र की ओर से मनाए जा रहे विश्व पर्यावरण सप्ताह कार्यक्रम के तहत वैज्ञानिकों, कर्मचारियों ने पर्यावरण संरक्षण एवं जागरूकता की अलख जगाने के लिए माचिया बायोलॉजिकल पार्क में पढ़ यात्रा की। उप वन संरक्षक डॉ. महेंद्र सिंह राठौड़ एवं वीएस राठौड़ ने पार्क में अतिथियों का स्वागत किया तथा माचिया पार्क के विभिन्न पादपों, वन्य जीवों एवं गतिविधियों की जानकारी दी। दिनोंदिन बढ़ते पर्यटकों की संख्या को देखते हुए पार्क को और अधिक सुंदर एवं आकर्षक बनाने के प्रयास किए जा रहे हैं। काजरी निदेशक डॉ. ओपी यादव ने कहा कि पथरीली जमीन एवं प्रचंड तापमान में इन क्षेत्रों में पेड़-पौधे उगाना कठोर काम है। पार्क में

बहुत महत्वपूर्ण प्रजातियों के पेड़-पौधों एवं वन्य जीवों की वंशवृद्धि के लिए बहुत प्रयास किए गए हैं। प्रकृति एवं प्राकृतिक वास एवं पारिस्थितिक तंत्र को बिलोपन से बचाने का एक जीवंत मॉडल है। उन्होंने कहा कि जीवों को तापमान से बचाने के लिए संस्थान ने स्थानीय वनस्पतियों को काम में लेकर मौसम अनुकूल उन्नत आवास बनाने की तकनीक विकसित की है, जिसमें जीव गर्मी, सर्दी, बारिश के मौसम की विषम परिस्थितियों में भी सहजता से रह सकते हैं। प्रशासनिक अधिकारी आईवी कुमार ने धन्यवाद ज्ञापित किया। वरिष्ठ वैज्ञानिक डा दीपांकर साहा बताया कि शुक्रवार को काजरी पुस्तकालय में भारतीय रेगिस्तान में वन्य जीवों के संरक्षण विषय पर कक्षा 8 से 10 वीं के विद्यार्थियों के लिए निबंध प्रतियोगिता आयोजित की जाएगी।

केंद्रीय वन मंत्रालय ने कहा : एक साल में तैयार करें राष्ट्रीय योजना, हर साल एक लाख हेक्टेयर जमीन हो रही है बंजर

काजरी-आफरी को दी मरुप्रसार रोकने की जिम्मेदारी



श्रीमान मरु प्रसार रोक केंद्र पर कुव्वार की अग्रणी ने अंतर्राष्ट्रीय कार्यक्रम में संबोधित करती हैं।

एनक्स रिपोर्ट। काजरी, जोधपुर, वन एवं जलवायु परिवर्तन मंत्रालय ने देश में बढ़ रहे मरुस्थलीकरण को रोकने के लिए केंद्रीय शुष्क क्षेत्र अनुसंधान संस्थान (आरसी) और शुष्क वन अनुसंधान संस्थान (आरसी) को जिम्मेदारी दी है। मंत्रालय के ऑपरिंटा सचिव राजेशचंद्र खन्ने ने वन्य संसाधनों से कहा कि वे एक साल में शुरुआत के बाद का संवेदन विवरण को अगस्त सात 17 गुना तक बढ़ा देंगे अगस्त में जब वर्षा शिफ्ट में विचारों के विचारण पर वास्तु पाठ के साथ। स्थानीय ने कुव्वार को

विषय पर प्रसार रोक विषय पर आरसी में अतिरिक्त कर्मचारियों को संचालित करी हुए कक्षा लेवें में कई संस्थाओं/कार्य के सा सहा। कक्षा लेवें में अधिक जमीन खराब हो रही है। इसी द्वारा एनक्स किए उठाए के अनुसंधान वर्ष 2003 में वन्य में 94.53 विचारण हेक्टेयर जमीन अतिरिक्त हो 20.11 में बढ़कर 96.40 विचारण हेक्टेयर हो रही।

कार्यक्रम में यह भी लेते

किसकला प्रतियोगिता के विजेता पुरस्कर्त



परी की ओर से कुव्वार के विद्यार्थियों के लिए दो जमी पुरस्कार (कक्षा 5 से 8 तक) और वैश्विक स्तर पर प्रथम स्थान पर जीते हुए विजेताओं को 80000 तक की राशि का पुरस्कार दिया जाएगा।

इस केंद्र पर कुव्वार द्वारा संचालित कला प्रतियोगिता का आयोजन किया जा रहा है। इस प्रतियोगिता में विद्यार्थियों को प्रथम स्थान पर जीते हुए विजेताओं को 80000 तक की राशि का पुरस्कार दिया जाएगा।

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ENVIS CAZRI Website

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 : **Miss. Taru Mathur**, IT Assistant, ENVIS, ICAR-CAZRI, Jodhpur

वायु कटाव पर नियंत्रण से तेज हवा की गति से बिजली पैदा होगी : डॉ. पी सांतरा



जोधपुर, काजरी के वरिष्ठ वैज्ञानिक डॉ. पी. सांतरा ने कहा है कि वायु कटाव के कारण बहुत बड़ा क्षेत्र प्रभावित होता है। काजरी मैकेनिकल वॉटर विकसित करने पर शोध कार्य कर रहा है। इससे वायु कटाव पर नियंत्रण होगा और तेज हवा की गति से बिजली पैदा होगी। उन्होंने तेज हवा, आंधी के लिए पूर्व चेतावनी प्रणाली विकसित करने की आवश्यकता जताई। डॉ. सांतरा गुरुवार को केंद्रीय वन एवं जलवायु परिवर्तन मंत्रालय के मरु प्रसार रोक केंद्र की ओर से विश्व मरुस्थलीकरण दिवस पर काजरी में आयोजित कार्यक्रम में मुख्यवक्ता के रूप में बोल रहे थे। उन्होंने कहा कि वायु की तेज गति के कारण खेतों की मिट्टी उड़ती है। इससे पर्यावरण तथा जलवायु पर विपरीत प्रभाव पड़ता है। ये मिट्टी समुद्र, नदी, नालों में जमा हो जाती है जो पूरे पारिस्थितिकी तंत्र को अस्तंगित कर देता है। काजरी निदेशक डॉ. ओपी यादव, डॉ. सुरेश कुमार, डॉ. दीपकर साहा ने भी संबोधित किया। तकनीकी अधिकारी तीर्थदास ने आभार जताया।

जैव विविधता के संरक्षण से समृद्ध होगा पर्यावरण

काजरी/जोधपुर. काजरी में मरु प्रसार रोक पर्यावरण सूचना केंद्र की ओर से अंतरराष्ट्रीय जैव विविधता दिवस-2016 आयोजित किया गया। कार्यक्रम के मुख्य अतिथि, कृषि विश्वविद्यालय, जोधपुर के कुलपति प्रो. बलराज सिंह ने कहा कि जैव विविधता का संरक्षण कर पर्यावरण को समृद्ध बनाया जा सकता है। उन्होंने जलवायु परिवर्तन, नदी, नालों में जमा हो जाती है जो पूरे पारिस्थितिकी तंत्र को अस्तंगित कर देता है। काजरी निदेशक डॉ. ओपी यादव, डॉ. सुरेश कुमार, डॉ. दीपकर साहा ने भी संबोधित किया। तकनीकी अधिकारी तीर्थदास ने आभार जताया।

निदेशक डॉ. ओपी यादव ने कहा कि कच्चा, मूंग, मेट ससियाँ से यहाँ उगाया जा रहा है, जो जैव विविधता का भंडार है। मरु प्रसार रोक पर्यावरण सूचना केंद्र के प्रमुख डॉ. सुरेश कुमार एवं वरिष्ठ वैज्ञानिक डॉ. दीपकर साहा ने बताया कि काजरी एन्विस को स्ट्रेट पर मरु प्रदेश के कृषि, जल संसाधन, और मौसम, पशुधन संबंधी अंकड़े एवं उनका आकलन भी उल्लेख है, जिसका उपयोग शोधार्थी अपने विभिन्न परियोजना, कार्यक्रम में कर सकते हैं।