

Info**SCIENCE**

Volume-02, No.-01 (2020)

... the science information



COVID-19 / Novel Corona Virus *Be Safe... Be Careful... Stay at Home*



Shri R.L.T. College of Science, Akola

Principal's Message ...



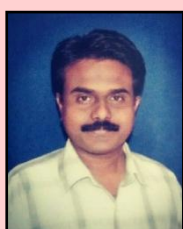
I am extremely pleased to present the 1st issue of 2nd volume of science magazine... *infoSCIENCE* of Shri R.L.T. College of Science, Akola. This issue is incorporated with various informative scientific and research articles. I am sure that, it will help the readers and contributors to update their knowledge and will give good exposure to recent developments in science and technology. I am confident that, this magazine will prove to be the excellent platform to researchers, teachers and students to present their scientific ideas and research output.

With concern to spreading novel corona virus i.e. COVID-19, three informative articles are included in this issue. I congratulate the editors of *infoSCIENCE*, who worked extremely hard for bringing out this issue within stipulated time.

Dr. Vijay D. Nanoty

Principal, Shri R.L.T. College of Science, Akola

Editor's words ...



It gives us immense academic pleasure to present the 1st issue of 2nd volume of science magazine... *infoSCIENCE* of Shri R.L.T. College of Science, Akola. The aim of publication of *infoSCIENCE* is to provide the common platform to researchers, teachers and students to share their innovative ideas and research plan in the field of science and technology for sustainable development of human society.



This issue is enriched with various scientific and research articles of varied ideas and diverse views. Herein, we have included three articles correlated with basic aspects and concepts of novel corona virus, COVID-19. We are sure that, readers will definitely get benefitted from it.



The board of editors is very much thankful to our patrons, honorable executive members of the Berar General Education Society, Akola and advisors for extending the support and being inspiration to this scientific project. We would like to thank all authors for contributing their valuable articles for publication in *infoSCIENCE* and extend best wishes to all the readers. Editors sincerely thank to teacher colleagues and student friends for their encouragement and kind support.



We would like to make sincere appeal to all researchers, teachers and students to contribute to the *infoSCIENCE* by sending articles.

Dr. Sushil M. Nagrale, Dr. Pradip P. Deohate

Dr. (Mrs.) Anjali A. Sangole and Prof. Vinod D. Deotale

Editors, *infoSCIENCE*

InfoSCIENCE

Volume-02, No.-01 (2020)

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Fabrication of Nano Structured Based Zinc Oxide (ZnO) Sensor for Humidity Sensing Application

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Humidity measurement is one of the most significant issues. Humidity is the amount of water vapours present in the air. It plays an important role for comfort of the human life and even in the industrial sector. Nowadays, the thick / thin film humidity sensors are widely used to their small size, low cost, less power composition and high performance. In present work, the research has been carried out to make a good quality and ceramic, porous humidity sensors.

Humidity measurement is one of the most significant issues in various areas of applications such as instrumentation, automated systems, agriculture, climatology and geographic information system. Humidity is the amount of water vapours present in the air and plays an important role for comfort of the human life. Even in the industrial sector, the humidity should be control and optimum result of this will get better quality product.

The search is made for a material or methods that can detect humidity, that will react quickly, will not drift over a long period of time or it will be cheap to manufacture and to be operating accurate over the entire humidity range.

Nowadays, the thick / thin film humidity sensors are widely used because of their small size, low cost, less power composition and high performance. As to solve these problems, the research in this field has been carried out to make a good quality and ceramic, porous humidity sensors.

Aims and objectives of the study are

1. Synthesis of pristine of ZnO nanoparticles.
2. Investigation of the conductivity of sensors at room temperature and different operating temperature (30-90°C) by

varying relative humidity (30-90% RH).

3. Study of hysteresis loop of humidity sensors.
4. Evaluating the effect on sensitivity, stability.
5. To characterized synthesized material by XRD, FE-SEM, E-DAX and TEM.

Humidity sensing mechanism of metal oxide based sensors

There are two major classification of adsorption.

- **Physisorption** - Weak bonding, heat of adsorption is less than about 6 Kcal/mol. Physisorption is weak adsorption, usually associated with dipole-dipole interaction between the adsorbate and adsorbent.
- **Chemisorption** - Strong bonding, heat of adsorption is usually greater than about 15 Kcal/mol. A chemisorbed species can interact more strongly with the solid. In principle of both adsorptions, there is no movement of atoms from their lattice position. In practice, in chemisorption there is movement and relocation of surface atoms.

Water absorption mechanism on oxide surface

Physisorbed water, adsorbed on a hydroxylated surface requires much lower temperature to remove. This form of water

(together with chemisorbed water) is particularly important in humidity sensors.

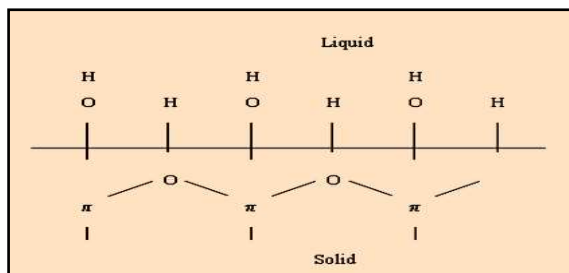


Figure : Adsorption of water vapour from air

Water acts as a donor contributing electron to the oxide semiconductor. It has been shown with the most semiconductors that the adsorption of water causes such electron injection. One possible explanation that has been proposed is that the interaction of adsorbed oxygen with the water molecules or possibly with the chemisorbed water causes the energy level of the adsorbed oxygen ions to fluctuate so they easily inject electron. Other explanations involve the water as a reducing agent injection electron into the semiconductor.

Methods for nanomaterials synthesis

Generally the methods of synthesis of nanomaterials can be categories such as -

- **Liquid phase synthesis** - Sol-gel method, co-precipitation, microwave synthesis, hydro-thermal / solvo-thermal synthesis, sonochemical synthesis, micro-emulsion, template synthesis and biomimetic synthesis.
- **Gas phase synthesis** - Pulsed laser ablation, spark discharge generation, ion sputtering.
- **Vapour phase synthesis** - Spray pyrolysis, laser pyrolysis / photochemical synthesis, thermal plasma synthesis, flame synthesis, flame spray pyrolysis, low-temperature reactive synthesis.



Figure : Furnace, filtration, magnetic stirrer

Synthesis of zinc oxide (ZnO) nanoparticles

For ZnO nanocrystalline, the 0.2 M zinc acetate dehydrates was dissolved in 100 ml deionised water. The 0.2 M zinc acetate dehydrates were dispersed in aqueous 0.02 M solution of NaOH followed by sol-gel method. The precipitate was obtained at the bottom of the beaker and it was filtered. Precipitate washed with the deionized water and methanol and dried at 80⁰C for 4 hrs. This fine nano-powder of ZnO was calcinated at temperature 800⁰C for 6 hrs.

Preparation of thixotropic paste

The fine powder of pure nano powder of ZnO in different molecular weight ratios are mixed with ethyl cellulose in a mixture of organic solvents butyl

cellulose, butyl carbitol acetate and terpineol such that the organic to inorganic ratio is (25:75).

Fabrication of thick films

The thick films were fabricated on glass substrate by employing prepared thixotropic paste with the help of screen printing technique. The prepared films were dried at 80-110⁰C for 1 hr. and it was fired at 500⁰C for 25 min. in muffle furnace, so that all the organic materials and organic impurities can be evaporated from the sensor materials. The thickness of the films was calculated by using gravimetric weight difference method and it is found to 23.01 μm.

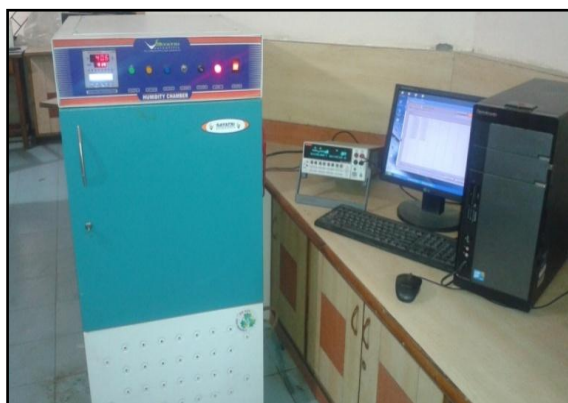
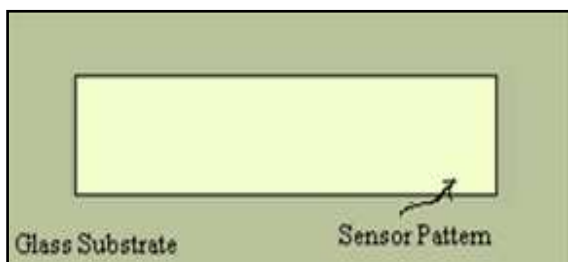


Figure : Set up of humidity sensor system

Characterization

All the peaks are perfectly match with pure ZnO structure [JCPDS card no. 36-1451] which indicates the high purity of the obtained ZnO nanoparticles having hexagonal wurtzite structure. The average crystalline size was found to be 37.32 nm. The shape of ZnO nanoparticles are like to

dumbel, nanoroads and their average crystalline size is found to be 56.78 nm.

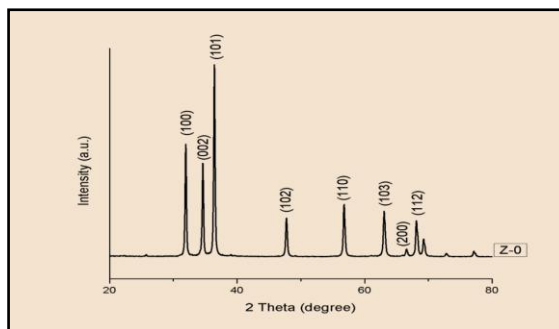


Figure : XRD of pristine ZnO

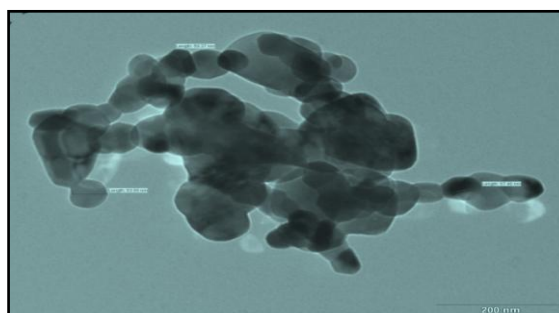


Figure : TEM of pristine ZnO

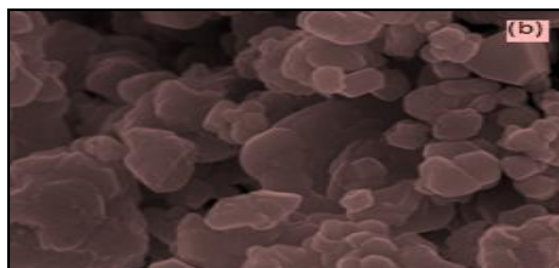


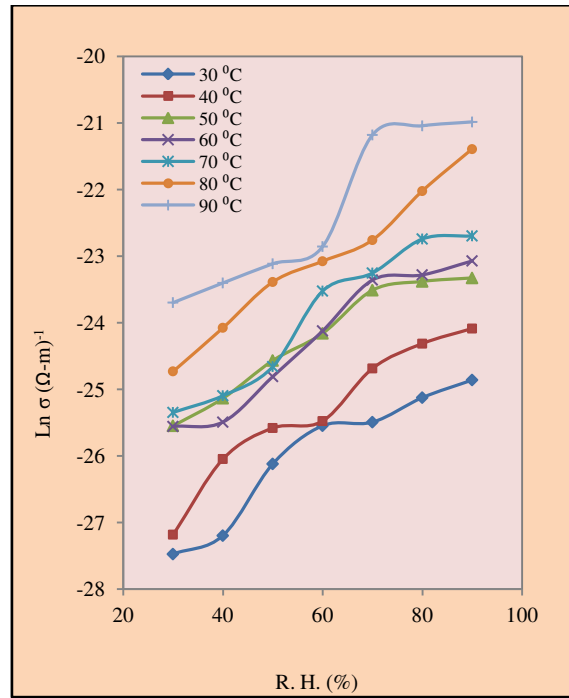
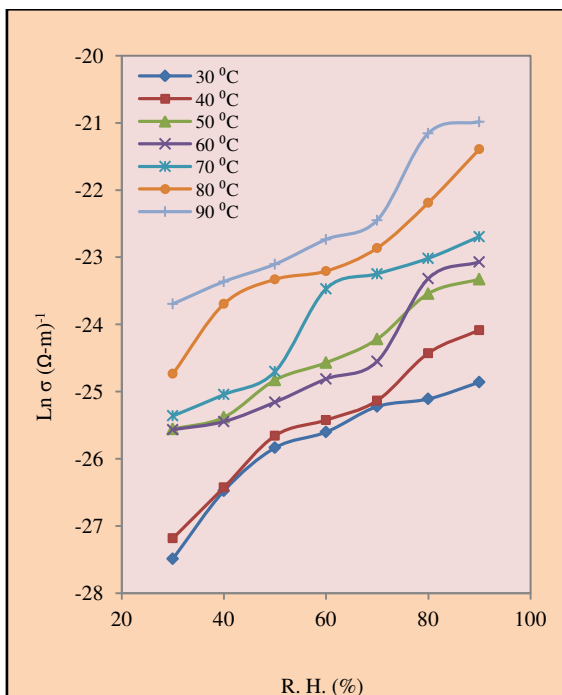
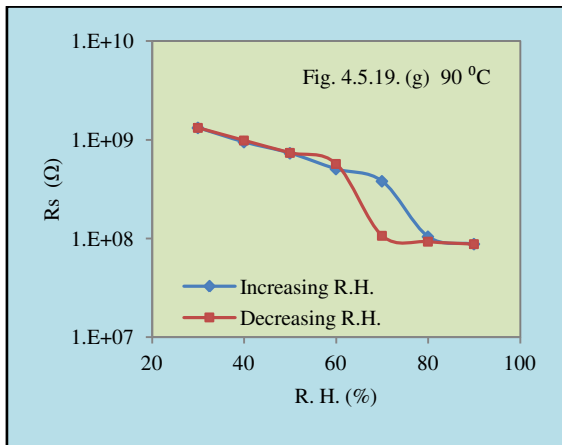
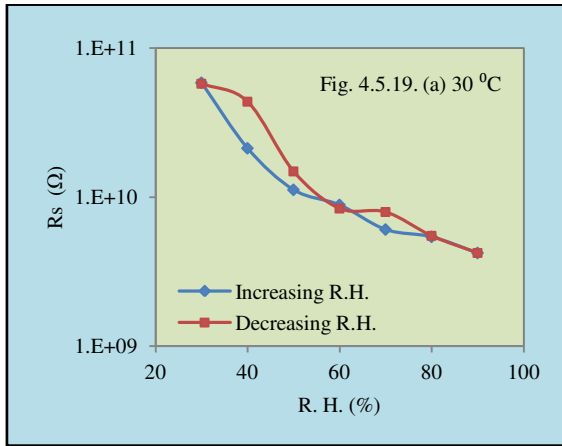
Figure : FE-SEM of pristine ZnO

Figure (b) shows the surface morphology of pure ZnO thick films. In these the particle are in both spherical and hexagonal shape with the average size 41 nm. The particle size observed in FE-SEM measurement is less than the crystalline size using TEM and greater than XRD measurement.

Hysteresis loop

A very small hysteresis present during forward and reverse cycle of relative humidity, where as a very significant average change observed in the value of resistance of sample, in the range

of $10^{11}\Omega$ to $10^8 \Omega$ in all the samples from 30 to 90% RH except in the sensor pristine ZnO materials these is a remarkable change in the value of resistance of at temperature 30°C to 90°C .



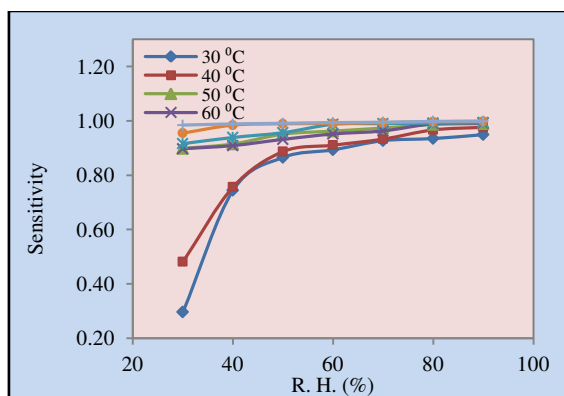
Conductivity

In all the samples of series-I the conductivity found to be lowest at temperature 30°C while it is highest at temperature 90°C . It is also important that there is large difference in conductivity value at temperature 30°C and other ones. But beyond the temperature 30°C , the conductivity curves are frequently crowded and mixed together.

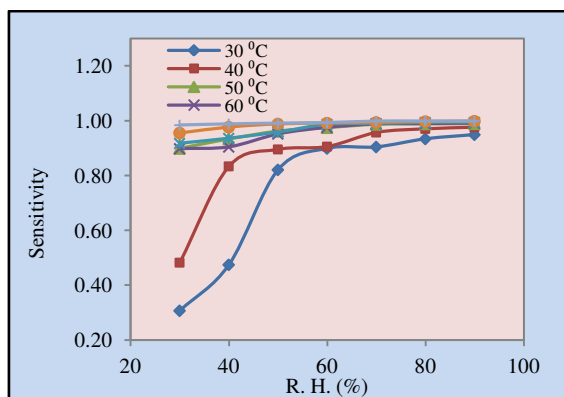
In the prepared film conductivity is found to be increases linearly with the increase in RH and The change in resistance with RH is more. In this the conductivity difference between temperature 30°C and other ones are minimizes and the conductivity curves are not seen mixed. Hence the stability, linearity and equality are obtained in the samples. The conductivity increases linearly with increasing RH% up to 90% and it falls rapidly between 90-30% it get stabilized. The conductivity gets stabilized through the resistance to near in the range 4 to 6 MΩ of all the samples.

Sensitivity

In the above samples the sensitivity is found to be increasing with the RH for all the samples of thick films and it is increasing up to some particular RH and then afterward it remains constant. For higher RH the sensitivity is found to be higher in case of all samples of thick films. The sensitivity of pure ZnO is found to be more.



Increasing



Decreasing

As previously stated the change in conductivity is more the similar change is observed in sensitivity also.

Conclusion - The XRD analysis of the samples shows that the materials are in nano crystalline form i.e. the grain size is in the range of nanometer. This nano particles size crystalline are solely responsible for humidity sensing mechanism. The crystalline size and purity of the synthesis material was also confirmed by TEM and E-DAX analysis of the synthesized material. The surface morphology was confirmed by using FE-SEM analysis and which is responsible for humidity sensing. The hysteresis plot reveals a very significant average change observed in the value of the resistance of the sample in the range $10^{11}\Omega$ to $10^8 \Omega$ which shows the very large average change in the value of the resistance during the temperature change from 30°C to 90°C . The hysteresis in samples minimizes and adsorption and desorption processes are much faster in pristine ZnO materials. The conductivity of the samples also increases linearly with the increase in RH up to 30-90% RH and then it fall rapidly 90-30% RH and the conductivity get stabilized through the resistance near in the range 4 to 6 M Ω . Stability of the sensors was checked for around 60 h and it was found to be the sensors are nearly stable and shows least detection limit for humidity sensing. On comparing the properties of bulk pellets it was observed that the thick films are much sensitive to the humidity sensing.

Cremation and its Hazardous Impact on the Environment

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A method of final disposition of a dead body through burning is cremation. A traditional pyre takes about 6 hours and 300 to 600 kilogram of dry woods for completion. Every year, 50 to 60 millions of trees are burned during cremation in our country. This burning results in releasing 8 million tones carbon dioxide and greenhouse gases in atmosphere. The aim of present study is to develop scientific temper and progressive thinking among the society. The districts included in this study were Akola, Amravati, Yavatmal, Washim and Buldana of Vidarbha region of Maharashtra and points observed for the results were amount of wood used for one death, no. of deaths per day and amount of wood used per day.

Cremation is a method of final disposition of a dead body through burning. According to the IUCN, the recommended forest area for any country with respect to its total area is about 33%. But India has only 19% area covered by forest. According to Global Carbon Project-2018, India ranks 4th in the list of the country's that emits most amount of CO₂ in the atmosphere. Notably, it is found that burning of wood is the most prominent cause for that.



A traditional pyre takes about 6 hours and 300 to 600 kilogram of dry woods for completion. Every year, 50 to 60 millions of trees are burned during cremation in our country. This burning results in releasing 8 million tones carbon dioxide and greenhouse gases in

atmosphere. This causes air pollution. Deforestation is the main reason for global warming. Not only this, affects our nature cycle, but also the ashes are thrown down into the rivers on the altar of moksha which causes increased toxicity in the water, causes water pollution resulting in the death of most marine animals. The 3 lakh of tones of dry wood per year, costing about 300 crore is sacrificed at the altar of moksha. Only Delhi burns about 10 crore's wood under the funeral pyre every year (Data-Ministry of Environment and Forest).

The present work is done to develop scientific temper and progressive thinking among the society. The work is done to cities that come under Amravati Division i.e. under Sant Gadge Baba Amravati University, Amravati in Vidarbha region of Maharashtra. The data collected from 5 different districts namely Akola, Amravati, Yavatmal, Washim and Buldana.



Survey pattern is used to cover at least 2-3 cemeteries per district. Following points were observed for the results.

1. Amount of wood used for one death.
2. No. of deaths per day.
3. Amount of wood used per day.

Amount of the CO₂ released is calculated from above data. Observation table on one week data over buried body holds all the results. This data is observed from 15th to 21st December 2019.

According to IUCN, burning of 1 kg of wood generates approximately 1.7 to 1.9 kilogram of CO₂ and greenhouse gases

in atmosphere. A fully grown tree gives about 100 kilogram of dry wood mass.



Sr. No.	Districts and rural places	Amount of wood used for 1 death (kg)	No. of deaths in a week	Wood used for no. of deaths per week (kg)	No. of trees probably get cut to fulfill the supply	Amount of CO ₂ and greenhouse gases released per week (kg)
1.	Akola	220	09	1980	20	3564
2.	Pinjar	200	03	600	06	1080
3.	Patur	210	04	840	08	1512
4.	Amravati	240	10	2400	24	4320
5.	Achalpur	210	02	420	04	756
6.	Paratwada	220	03	660	07	1188
7.	Buldhana	240	05	1200	12	2160
8.	Malkapur	220	03	660	07	1188
9.	Chikhali	220	02	440	04	792
10.	Yavatmal	230	12	2760	28	4968
11.	Wani	220	02	440	04	792
12.	Washim	230	15	3450	35	6210
13.	Mangrulpir	210	04	840	08	1512
14.	Karanja	220	06	1320	13	2376

It should be the moral duty of every being belonging to death ones plan to plant at least one tree and nourish it as its own child.

1. Electrical/gas crematorium - A traditional pyre normally costs about Rs. 2500 to 3000 per death where as electrical crematorium costs about Rs. 2200 per body and gas crematorium costs about Rs. 1500 per body. Hence it is cheaper in nature. It

destroys human body effectively and completely where as pyre doesn't.

2. To bury body as it is - Buried body may act as a fertilizer, where as the ash is not worth it.

3. To donate organs to the needy ones - Organs like eyes, liver, kidney, skin, can be donated to the needy people or body should be donated to any government medical college.

4. To design wood cremation system that burns less wood - Reduces emission up to 60%, takes about 2 hours to completion and 150 to 200 kilogram of woods only (Designed by MOKSHADA, NGO in Delhi).



From the survey it is observed that,
1. There is a burning of lots of wood which causes hazardous effects on environment as well as ecosystem. People's residing

around the locality of this cemetery is affected from various pollution problems.

2. The optional solutions over traditional pyre are cost effective as well as they are environment friendly.

3. This solutions can bring a change to old mentality of society on the altar of Moksha, and develops the scientific temper among the people.

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Analysis of Ground Water Quality of Some Villages in Akola District and its Suitability for Irrigation of Agriculture Land

Ankita R. Bagade, Kanchan S. Somwanshi and Dr. Pradip P. Deohate

Department of Chemistry, Shri Radhakisan Laxminarayan Toshniwal College of Science, Akola, 444 001, INDIA

Analysis of ground water quality of some villages in Akola district of Maharashtra its suitability for irrigation of agriculture land was done to find out the factors that maintain quality of ground water. Ten ground water samples were assessed in the month of January-2020 for parameters i.e. temperature, colour, pH, EC, alkalinity, chloride, sulphate, calcium, magnesium, sodium, potassium, TDS, COD, DO and BOD. Sodium hazard associated with the irrigation water was evaluated using SSP and SAR criteria. Results were matched with Bureau of Indian Standards (BIS) limits. On the basis of irrigation quality parameters, all the samples were found to be suitable for irrigation of agricultural land.

The ground water is one of the best known ionizing agents because most substances are sometime soluble in water. Water combines with certain salt to form hydrates. It reacts with metal oxides to form acids. It acts as a catalyst in many important chemical reactions.

Agriculture is the most important economic activity constitutes the major source of food and earning. The water is the major source for irrigation in India. The irrigation water quality is a crucial factor for long term soil productivity. The concentration and composition of dissolved constituents in water determine its quality for irrigation purpose. Quality of water is an important consideration in any appraisal of salinity or alkali conditions in an irrigated area. The good quality of water has the potential to cause maximum yield whereas poor quality water can develop various soil and cropping problems. Therefore special management practices may then be required to maintain full crop productivity.

The poor quality water may affect irrigated crops by causing accumulation of salts in the root zone, by causing loss of permeability of the soil due to excess sodium or calcium leaching, or by containing pathogens or contaminants which are directly toxic to plants or to those consuming them. Contaminants in

irrigation water may accumulate in the soil and, after a period of years, render the soil unfit for agriculture. Even when the presence of pesticides or pathogenic organisms in irrigation water does not directly affect plant growth, it may potentially affect the acceptability of the agricultural product for sale or consumption.

The water quality for irrigation also depends on the nature, composition of soil, sub-soil, depth of water table, topography, climate etc. Water quality reflects inputs from atmosphere, soil, water rock weathering and pollutant sources. Water required for irrigation depends upon the dissolved salts like Na, Ca, Mg and HCO_3 in water. Concentration of these salts and their ratio to one another are influence the quality of water for irrigation. However, such water influences crops yield. Irrigation water with high salt content can bring about displacement of cations like Ca and Mg from the clay minerals of the soil, followed by replacement of cation by sodium. The main constituents affecting quality of irrigation water are Ca, Mg, Na and alkalinity of water. Increased concentration of these constituents in water changes the soil quality and makes it unsuitable for cultivation of crop.

Irrigation water quality is mostly checked on the basis of factors such as

soluble sodium percentage (SSP) and sodium absorption ratio (SAR). It also depends upon temperature, colour, hydrogen ion concentration (pH), electrical conductivity (EC), alkalinity (HCO_3^{2-} , CO_3^{2-} , OH^-), chloride (Cl^-), sulphate (SO_4^{2-}), calcium (Ca^{2+}), magnesium (Mg^{2+}), sodium (Na^+), potassium (K^+) present in water. Total dissolved solids (TDS), chemical oxygen demand (COD), dissolved oxygen (DO) and biological oxygen demand (BOD) also affects the quality of water.

$$\text{SSP} = \frac{[\text{Na}^+]}{[\text{Ca}^{2+} + \text{Mg}^{2+} + \text{Na}^+ + \text{K}^+]} \times 100$$

$$\text{SAR} = \frac{[\text{Na}^+]}{\sqrt{[\text{Ca}^{2+} + \text{Mg}^{2+}] / 2}}$$

Present study deals with the analysis of ground water quality of villages Borgaon Manju and Gandhigram in Akola district for irrigation purpose. This study was done in the month of January-2020. The instruments used were conductivity meter, flame photometer, colorimeter, pH-meter, spectrophotometer, digital thermometer, hot air oven, incubator etc. Weighing was done on digital electronic

balance. Chemicals of AR grade were used.

Area of study - Ground water of agricultural land of the villages Borgaon-Manju and Gandhigram in district Akola, Maharashtra.

Irrigation water sample collection - Leak proof glass bottles were thoroughly washed and cleaned before sampling the water. Water samples were directly collected from pump discharge after pumps have been run for 15 min. Bottles were labelled and transferred to laboratory. Parameters like colour and temperature were measured at the spot.

Methods - Titrimetric and instrumental.

It was found that the parameters like temperature, pH, electrical conductivity, total alkalinity, chloride, sulphate, calcium, magnesium, sodium, potassium, chemical oxygen demand, dissolved oxygen and biological oxygen demand of all samples were found to be in desirable and permissible limit. The TDS of one sample was not found to be in desirable limit. Most of the water samples were found to be slightly alkaline in nature. Almost all water samples were found to be suitable for irrigation purpose based on irrigation quality parameters (Table-1 to 6).

Table 1 : Analysis of ground water samples of village Borgaon-Manju

Parameters	Ions	BIS limits	Results				
			W-01	W-02	W-03	W-04	W-05
Temperature	---	40 ⁰ C	27.1	27.0	26.4	27.0	26.8
Colour	---	---	----- Transparent / Colourless -----				
pH	---	6.5 to 8.5	7.61	7.90	7.84	7.71	8.50
EC (Soluble salts)	---	3000 $\mu\text{S}/\text{cm}$	820	800	950	1130	800
Alkalinity	HCO_3^{2-} , CO_3^{2-} , OH^-	40 meq/lit	8.12	9.28	12.76	17.40	13.92
Chloride	Cl^-	6 meq/lit	3.04	2.65	2.88	2.73	1.95
Sulphate	SO_4^{2-}	3.5 meq/lit	0.04	0.03	0.03	0.05	0.02
Calcium	Ca^{2+}	5 meq/lit	0.84	1.47	1.61	1.19	1.05
Magnesium	Mg^{2+}	4 meq/lit	1.33	0.56	1.61	0.77	0.84

Sodium	Na ⁺	8.5 meq/lit	4.91	3.82	4.39	6.61	5.35
	SSP	---	69.01	65.21	57.56	77.03	73.79
	SAR	Excellent, <10	1.04	1.01	1.27	0.99	0.97
Potassium	K ⁺	2.5 meq/lit	0.02	---	---	---	---
TDS	---	600 mg/lit	1100	600	500	100	300
COD	---	250 mg/lit	44	40	64	56	20
DO	---	10 mg/lit	4.12	4.48	5.08	5.80	6.88
BOD	---	30 mg/lit	0.40	0.40	2.56	1.68	3.60

Table 2 : Analysis of ground water samples of village Gandhigram

Parameters	Ions	BIS limits	Results				
			W-06	W-07	W-08	W-09	W-10
Temperature	---	40 ⁰ C	26.5	27.0	27.2	26.8	27.0
Colour	---	---	----- Transparent / Colourless -----				
pH	---	6.5 to 8.5	7.41	8.02	7.97	7.75	7.69
EC (Soluble salts)	---	3000 μ S/cm	780	810	800	800	460
Alkalinity	HCO ₃ ²⁻ , CO ₃ ²⁻ , OH ⁻	40 meq/lit	15.71	9.28	9.86	8.41	5.91
Chloride	Cl ⁻	6 meq/lit	2.10	2.18	3.43	2.49	1.64
Sulphate	SO ₄ ²⁻	3.5 meq/lit	0.03	0.05	0.03	0.03	0.01
Calcium	Ca ²⁺	5 meq/lit	1.47	2.46	2.18	2.25	1.54
Magnesium	Mg ²⁺	4 meq/lit	1.19	0.70	0.91	1.40	0.70
Sodium	Na ⁺	8.5 meq/lit	2.74	1.82	3.21	1.52	0.95
	SSP	Excellent, <20	50.36	36.38	50.95	29.22	29.11
	SAR	Excellent, <10	1.15	1.25	1.24	1.35	1.06
Potassium	K ⁺	2.5 meq/lit	0.02	0.02	---	0.02	0.07
TDS	---	600 mg/lit	400	100	100	400	500
COD	---	250 mg/lit	68	60	36	52	20
DO	---	10 mg/lit	3.40	4.20	3.84	5.28	4.88
BOD	---	30 mg/lit	1.20	0.40	1.84	0.88	0.28

Table 3 : Classes of ground water on the basis of EC (US Salinity Laboratory)

Class	Water Quality	EC (μ S/cm)	Suitability
C1	Low salinity	< 250	Suitable for most soil
C2	Medium salinity	250 to 750	Suitable for moderate drainage soil
C3	High salinity	750 to 2250	Unsuitable for restricted drainage soil
C4	Very high salinity	> 2250	Unsuitable for irrigation under average conditions

Table 4 : Classes of ground water on the basis of concentration of chloride

Class	Water Quality	Chloride (meq/lit)	Sulphate (meq/lit)
C1	Excellent	< 2	< 4
C2	Good to injurious	2 to 6	4 to 12
C3	Injurious to unsuitable	> 6	> 12

Table 5 : Classes of ground water on the basis of SSP (US Salinity Laboratory)

Class	Water Quality	SSP
S1	Excellent	< 20
S2	Good	20 to 40
S3	Permissible	40 to 60
S4	Doubtful	60 to 80
S5	Unsuitable	> 80

Table 6: Classes of ground water on the basis of SAR (US Salinity Laboratory)

Class	Water Quality	SAR	Suitability
S1	Low sodium	< 10	Suitable for most soil
S2	Medium sodium	10 to 18	Suitable for coarse soil
S3	High sodium	18 to 26	Unsuitable for coarse soil
S4	Very high sodium	> 26	Unsuitable for most soil

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A Study on Antimicrobial Potential of *Tridax procumbens*

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Tridax procumbens linn belongs to the family composite. The extract of *T. procumbens* has been reported to have various pharmacological effects like wound healing, mosquito repellent activity, immunomodulatory effect and antiprotozoal effect. The methanolic extract of *T. procumbens* was used for this study. The anti-bacterial activity of methanolic extract of leaf was examined against *Esherichia coli*, *Proteus vulgaris* and *Staphyalococcus aureus*. Anti-bacterial activity was investigated by agar well diffusion method. The methanolic extract of *T. procumbens* showed effective inhibition against all the three bacteria which were used. Therefore, leaves of *T. procumbens* can be considered to be a promising source of anti-microbial compound. Phytochemical analysis for certain bioactive compounds was also performed which indicates presence of important phytochemicals like alkaloids and flavonoids.

For centuries plants have been used for both nutritional and medicinal purposes. The conventional medicine is not cheap and a large population of the people depends on traditional medicine for their health care needs. Over the years, herbal drugs have been shown to be effective against many diseases (Awe, Omojasola, 2003). Many plants and their parts are used for treatment of various diseases in different parts of world and are being screened for antimicrobial activities and the results obtained from these scientific studies have aided for medicinal uses of plants (Abo et al., 1999).

Plants have limited less ability to synthesize phytochemical substances, most are secondary metabolites. At least 12000 have been isolated, a number estimated to be less than 10% of the total (Bharti et al., 2016). This substance served as plant defence mechanism against predation by microbes, insects, herbivores some terpenoids are plant pigments, some are plant flavouring agents and some are having medicinal properties. The present study has been undertaken to establish the anti-bacterial activity of *T. procumbens*.

For this study different plant materials of *T. procumbens* were collected from various places and leaves and flowers were separated. A fine powder was obtained by grinding the dried leaves.

Weight of this powder was calculated and used for further soxhlet extraction. Soxhlet apparatus was used for the extraction purpose, methanol was used as solvent. The process of extraction was carried out at 70°C for 2-3 hours. The plant extract was collected and weighed. Methanolic extract obtained is then used for anti-microbial screening and phytochemical analysis.



Figure : Soxhlet extraction

Phytochemical analysis - It was done by performing the following tests.

Detection of alkaloids by Wagner's test - Methanolic extracts were treated with Wagner's reagent (iodine in potassium iodide). Formation of brown / reddish precipitate indicated the presence of alkaloid (Evans, 2002).

Detection of flavonoids by alkaline reagent test - Methanolic extracts were treated with few drops of sodium hydroxide solution. Formation of intense yellow colour which became colourless on addition on dilute acid indicated the presence of flavonoids (Siddiqi, Ali, 1997).

Detection of phenols by ferric chloride test - Methanolic extracts were treated with 3-4

drops of ferric chloride solution. Formation of bluish black colour indicated presence of phenols.

Antimicrobial activity test - Antimicrobial assay was performed by using the disc diffusion agar method (Bauer, Kirby, 1966). The microorganisms used in the present investigation were *S. aureus*, *P. vulgaris* and *E. coli*.

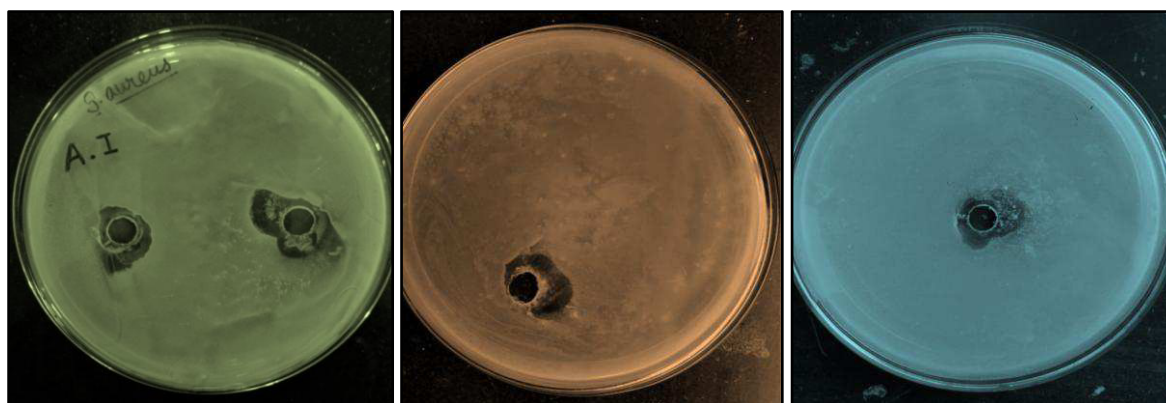


Figure : *S. aureus*, *P. vulgaris* and *E. coli*

Methanolic extract of *T. procumbens* showed active results against gram-positive *S. aureus* and gram-negative *E. coli* as well as *P. vulgaris*. A clear zone of inhibition was observed around wells indicate that the extracts produced certain chemical substances which are responsible for killing bacteria. Extract of *T. procumbens* showed zone of inhibition against *S. aureus* (31 mm), *E. coli* (11 mm) and *P. vulgaris* (20 mm).

Other medicinal values - Traditionally, *T. procumbens* has been in used in India for wound healing and as an anticoagulant, antifungal and insect repellent. It has antiviral, antibiotic, anti-inflammatory, antifungal, insect repellent, antioxidant and anti-diabetic activity. It is useful in jaundice, bronchial catarrh, diarrhea, dysentery, inflammation, hemorrhoids, anal fistula, ulcers, and promotes hair growth.

Conclusion - Pharmacological study of the plant and various bioactive compounds responsible for it have been reported. The plants could serve as useful source of new antimicrobial agent. *T. procumbens* possess

thermo labile antimicrobial factors that reduced the growth of pathogenic bacteria. The methanolic extract obtained from the leaves of *T. procumbens* inhibited the growth of *E. coli*, *S. aureus* and *P. vulgaris*. Phytochemical analysis showed presence of important bioactive compounds like alkaloids, flavonoids. Various pathogenic bacteria have developed resistance to many of currently available antibiotics. The leaves and flowers of *T. procumbens* possess antibacterial activity against human pathogens.

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Antagonistic Bacteria - A Perfect Amalgam of Bio-control Agent and Pesticide

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In the hazardous acquaintances of 21st century there are many relatable problems we are already facing and one of them is chemical pesticides. Pesticides are the substances that are meant to control pest, in general a pesticide is a chemical or biological agent that obstruct, incapacitates, kills or otherwise discourages pests. Chemical pesticides get bio-accumulate in the fats of human body which leads nerve disorder and respiratory disorder. It contaminates soil, water and other prototypes. To overcome this problem there was an urge to find a safe alternative. In present study bacteria isolated from the soil by serial dilution followed by four-ways streaking followed by cultural and morphological characteristics were observed by Gram's staining and Endospore staining. The pure cultures so obtained were then sub cultured and broth was prepared. Under the study the plant *Cajanus cajan* commonly called as pea is taken. On which the prominent pest *Europtis fraterna* was observed. On this selective pest *E. fraterna* the different prepared broth were sprayed and results were later observed.

Indian economy is mainly based on agriculture and its products. Agricultural yield mainly affected by pest and pesticides used in effective control of it. This can be basically presented by two additional postulations i.e. crop productivity and the pesticide used for its enhancement.

When we think about pesticides, we think of the chemical one's and not of the natural one's. We all are well known with the disadvantages of chemical pesticides as their drastic impact is now appearing in our day-to-day life. Besides contaminating the environment, including the soil and water, pesticide residues also affect useful organisms like earth worms, bees, spiders, plants (Singh et al., 2014). In addition to that, during the last couple of decades, the use of such synthetic chemicals has raised a number of environmental issues causing health hazards (Aktar et al., 2009).

Natural pesticides are bio-degradable. Bio pesticide is a potential tool to be utilized for environmental safety (Devi et al., 2012). Most natural pesticides have too low to moderate mammalian toxicity, safe to other botanicals and including the person applying them. More rational approaches would be required to popularize bio-pesticide as one of the

important inputs for safe and sustainable agriculture (Kamble et al., 2016).

The plant *C. cajan* is taken under study. This plant is one of the protein rich plant having innumerable medicinal properties. India is a principal pigeon pea growing country contributing nearly 90% of the total world production. Currently, it occupies an area of 3.85 million hectares with an annual production of 2.68 million tonnes (Kumar et al., 2010). On this plant numbers of pests are found but the most prominent pest observed was *E. fraterna*, commonly called as Tussock moth. It has four stages in its life cycle which are egg, larva, pupa, and moth. But mainly the larval stage infects the plants by destroying mainly the legumes and the leaves of the plant. So to kill this pest besides using the chemical pesticide, a safe alternative must be used. So in this study we isolate a bacterium from the soil which we can use as bio-pesticide. Soil and water are richest sources of bacteria but less than 1% of candidate isolates eventually make successful insecticidal products (Glare et al., 2012).

Isolation of bacteria - The garden soil was taken for the isolation of bacteria. It was diluted by the serial dilution technique. The

diluted soil suspension is then used to perform four-way streaking for isolation of pure culture. The pure culture obtained by four-way streaking was sub-cultured on slant for further procedure.



Figure : Serial dilution

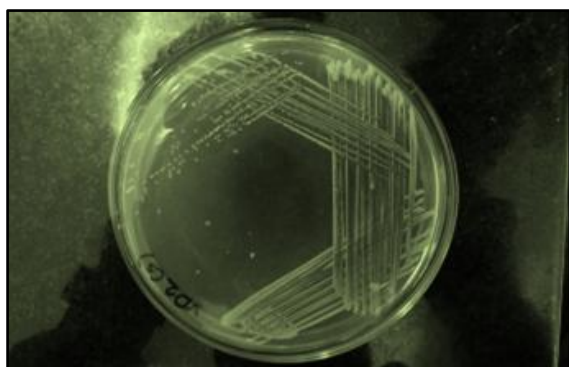


Figure : Four-way streaking



Figure : Pure slants

Cultural and morphological characteristic - The cultures so isolated were performed for staining procedures, both gram staining and Endospore staining was done. In the gram staining the bacteria were observed as gram positive (+), short rod. In the

Endospore staining the bacteria was found non-sporulating.

Selection of pest - Under study the plant taken was *C. cajan*, on which prominent pest observed was *E. fraterna* larvae. So, for the study *E. fraterna* larvae were selected as pest.

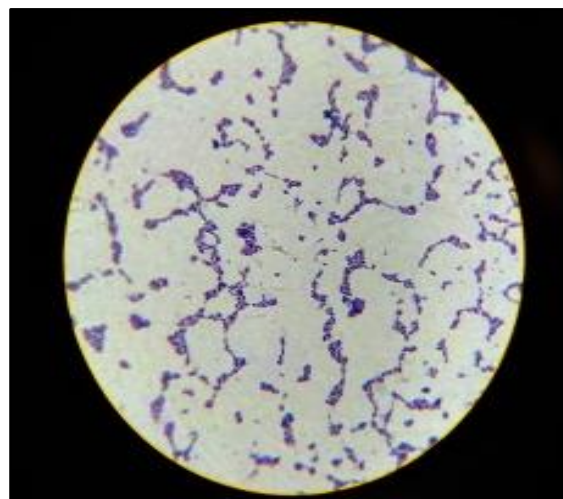


Figure : Microscopic slide

Four different broths prepared were VD1, VD2, VD3 and VD4. When sprayed on the target pest, among all the four broths only VD2 showed active results. When the broth VD2 was sprayed on the target pest it gets killed in broth in laboratory condition and natural condition. The other remaining broths didn't show the active results. The VD2 broth when sprayed on the target pest in the laboratory condition we got the results every time. But when sprayed in the natural condition out of three times, two times we got the prominent results.

Broths	Observations	Results
VD1	No prominent activity	Pest was not killed
VD2	Prominent and active results	Pest get killed
VD3	No prominent activity	Pest was not killed
VD4	No prominent activity	Pest was not killed



Conclusion - From the present study we can conclude that the plant *C. cajan* were widely infected by the pest *E. fraterna* larvae which can be control by use of soil bacterium which is used as bio-pesticide.

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Measuring the Diameter of Human Hair with Laser

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Often it is necessary to determine the diameter of a fine wire, thin thread or other object that cannot be measure by convectional means. Diameter of such items can be measured with laser by using methods of diffraction and interference known as Young’s double slit experiment.

Is it possible to calculate diameter of human hair using the laser? Yes, it is possible by the phenomenon of diffraction.

Often it is necessary to determine the diameter of a fine wire, thin thread or other object that cannot be measure by convectional means. Diameter of such items can be measured with laser by using methods of diffraction and interference known as Young’s double slit experiment. While Young’s experiment deal with the pattern of light impinging on two narrows slits separated by a small distance, the method can be applied to an object with a small diameter as well. Where, the diameter is within an order of magnitude of the wavelength of laser light used.

Diffraction - The bending of waves when they hit an object. The pattern produced by waves when they bend can be used to determine the structure of very tiny objects, such as the width of a human hair.

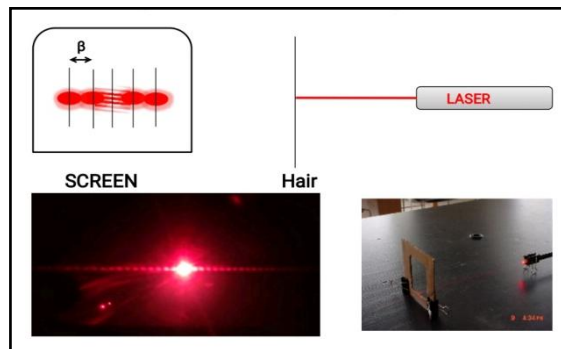
Laser - A device that generates an intense beam of coherent light of a single colour. Lasers are used in drilling, cutting, alignment guidance and in surgery.

Wavelength - The distance between one

peak and the next in a series of waves, or the distance between one trough and next.

Visible light - Which, like all electromagnetic radiation, travels in waves, includes wavelengths between 380 nanometer (violet) and 740 nanometer (red).

Arrangement of an experiment



Formula to calculate thickness

For Diffraction,

$$d \sin\theta = n\lambda$$

$$\therefore d = n\lambda / \sin\theta \quad \dots (\sin\theta = \beta / D)$$

$$\therefore \lambda = \beta d / D$$

$$\therefore d = \lambda D / \beta$$

Where,

β is fringe width

d is a thickness of hair

D is a distance between wire and screen

Sr. No.	Wavelength of the Laser Light (λ)	Distance of the screen from hair (D)	The value of (β)	Thickness of hair ($d = \lambda D / \beta$)
1.	6.50×10^{-5} cm	100 cm	0.6	1083.33×10^{-5} cm (Approx. 0.01083 cm)
2.	6.50×10^{-5} cm	90 cm	0.6	975.00×10^{-5} cm (Approx. 0.00975 cm)
3.	6.50×10^{-5} cm	80 cm	0.575	904.34×10^{-5} cm (Approx. 0.00904 cm)

Calculation

λ is 650 nm of a laser.

After converting in the centimeter we get the value as 6.50×10^{-5} cm.

Now, how to find the Value of β , distance between first fringe to the second fringe.

Calculate using a scale (cm).

D is distance between screen and hair.

Length of hair

Mean (d)

$(1083.33 + 975.00 + 904.34) / 3 \times 10^{-5}$ cm

i.e. 987.50×10^{-5} cm

COVID-19, Novel Corona Virus

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COVID-19 is the infectious disease caused by most recently discovered corona virus. This new virus and disease was unknown before the outbreak began in Wuhan, China in December 2019. The most common symptoms are fever, tiredness and dry cough. Some patients may have aches, pains, nasal congestion, runny nose, sore throat or diarrhea. One can reduce the chances of being infected or spreading this disease by regularly washing the hands with soap and water or cleaning with an alcohol based hand rub, maintaining the distance of 1 meter from anyone who is coughing or sneezing, covering mouth and nose with bent elbow or tissue while coughing or sneezing, avoiding touching the eyes, nose and mouth by hands, self isolation etc.

Corona viruses - These are a large family of viruses which may cause illness in animals or humans. In humans, several corona viruses are known to cause respiratory infections ranging from the common cold to more severe diseases such as MERS and SARS. The most recently discovered corona virus causes disease COVID-19.

COVID-19 - This is the infectious disease caused by most recently discovered corona virus. This new virus and disease was unknown before the outbreak began in Wuhan, China in December 2019.

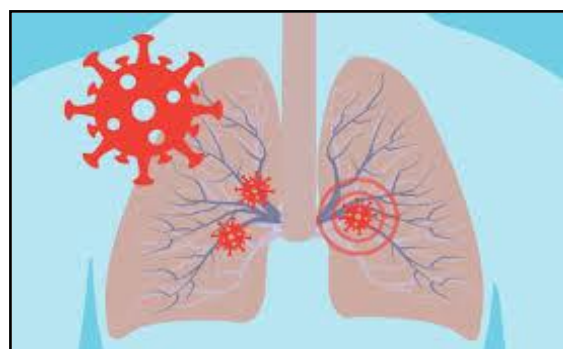


Symptoms - The most common symptoms are fever, tiredness and dry cough. Some patients may have aches, pains, nasal congestion, runny nose, sore throat or diarrhea. These symptoms are usually mild and begin gradually. Some people become infected but don't feel unwell. Most people recover from the disease without needing special treatment. Older people and those suffering from problems like high blood pressure, heart problems or diabetes are more likely to develop serious illness.

Spreading - This disease can spread from person to person through small droplets

from the nose or mouth which are spread when a person with COVID-19 coughs or exhales. These droplets land on objects and surfaces around the person. Other people then catch COVID-19 by touching these objects or surfaces, then touching their eyes, nose or mouth. People can also catch COVID-19 if they breathe in droplets from a person with COVID-19 who coughs out or exhales droplets. Studies till date show that this virus not transmitted through the air. One can reduce the chances of being infected or spreading COVID-19 by taking some simple precautions.

- Regularly and thoroughly clean hands with an alcohol based hand rub or wash them with soap and water.
- At least maintain the distance of 1 meter from anyone who is coughing or sneezing.



- Avoid touching eyes, nose and mouth by hands because these can pick up viruses and once contaminated hands can transfer the virus to your eyes, nose or mouth, from there virus can enter your body and can make you sick.

- Make sure all the people follow good respiratory hygiene like covering mouth and nose with bent elbow or tissue while coughing or sneezing. Dispose of the used tissue immediately.
- Stay home if feel unwell. If any, symptoms of fever cough and difficulty breathing take medical advice and call in advance to local health authority.
- Keep up to date on the latest COVID-19 hotspots, cities or local areas, where COVID-19 is spreading widely and avoid traveling to such places.

Protection measures - Persons who are in or have recently visited areas where COVID-19 is spreading can do the following things to prevent the spreading of disease.

- Self-isolate by staying at home if feel unwell and symptoms such as headache, low grade fever, slight runny nose, until you recover. If to go outside, e.g. to buy food and any other essential things, then wear a mask to avoid infecting other people. It helps to protect oneself and others from COVID-19 virus.
- If increasing fever, cough and difficulty in breathing take medical advice and confirm if it is due to respiratory infection or other serious cause. Call in advance to health care provider so as to get the right health facility. It will help to prevent spread of COVID-19 and other viruses.

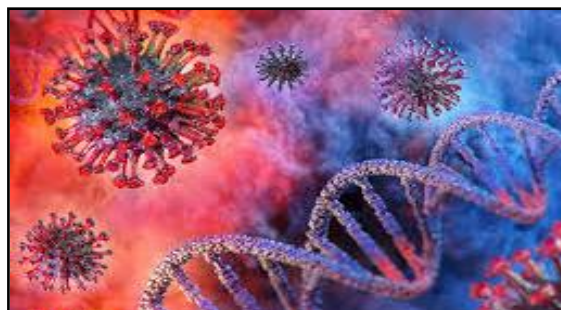
Persons at risk - Older persons and persons having pre-existing medical conditions like high blood pressure, heart disease, lung disease, cancer or diabetes.

Risk of catching - There are number of cities around the world, where the disease is spreading. For people living in or visiting these cities, the risk of catching COVID-19 is more. The government authorities are taking vigorous action after a new case of COVID-19 is observed.

Drug, vaccine, medicine - Till date, there is no specific antiviral drug, vaccine or medicine to prevent or treat COVID-19. Possible vaccines and some specific drug treatments are under investigation.

Incubation period - It is the time between catching the virus and beginning to have symptoms of the disease. Mostly incubation period for COVID-19 is from 1 to 14 days.

Virus survival on surfaces - It is not certain, but it seems to behave like other corona viruses. Studies suggest that corona viruses including COVID-19 may persist on surfaces for few hours to several days and may vary according to surface type and environment conditions i.e. temperature and humidity.



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Lichens - The Natural Bio-Indicator of Air Pollution

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Lichen is a unique symbiotic association between an alga and a fungus, where algal component is called phycobiont or photobiont while fungus as mycobiont. Lichens obtain almost all their nutrients from the atmosphere through uptake over their entire surface. Lichens exist in different growth forms and three of these are leafy, bushy / fruticose and crustose. Bio-indicators are one of the best, inexpensive and natural agents, forecasting the presence of pollutants in air. Lichens are the natural symbiotic organism found in almost every habitat express their growth with changed environmental conditions. Hence it can be used as pollution indicators.

Lichen is a unique symbiotic association between an alga and a fungus, where algal component is called phycobiont or photobiont while fungus as mycobiont. These are the composite organisms which have an ability to colonize on a variety of substrates including rock, soil, trees and man-made structures in diverse environmental conditions. They occur in all possible environmental habitats of the world, but are diverse in tropical region and luxuriant in temperate-alpine areas. These along with mosses form dominant organism in ecosystem covering over 10 % of the earth's terrestrial habitat (Nash and Egan 1988, Hawksworth 2001).

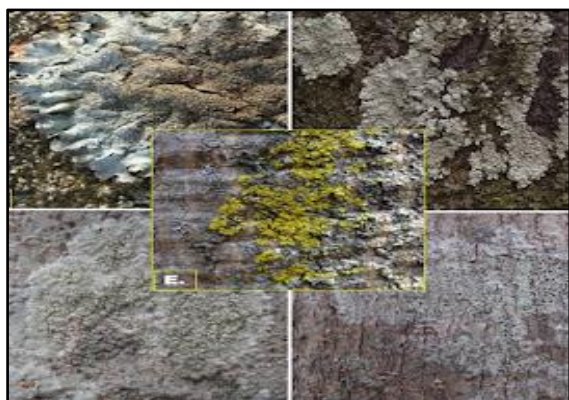


Figure : Some lichens species as bio-indicator of different air pollutants

Lichens obtain almost all their nutrients from the atmosphere through uptake over their entire surface. They have no cuticle, nor means of controlling nutrient uptake, unlike vascular plants, and free exchange of both gases and solutions

occurs across cell surfaces (Farmer 1992). In addition their surface area to mass is very high and assimilatory capacity relatively low. Lichens are therefore highly susceptible to changes in atmospheric chemistry and deposition and for this reason provide very sensitive indicators of such changes.

Lichens exist in different growth forms. Three of these are -

- Leafy, circular lobes with root like structures (rhizines) where the algal matt is sandwiched between the fungus.
- Bushy / fruticose, shrub-like small mounds, growing up from the ground or beard-like, small tangles hanging down, attached to the substrate only at their bases, with a circular cross-section and a central algal core.
- Crustose, closely adhering to the substrate, e.g. tree bark, stone, with the algae dispersed.

All but fruticose lichens grow slowly with growth of about 0.5 to 5 mm y^{-1} , measured by the expansion of their circles. Fruticose lichens grow vertically and quickly up to 2 cm y^{-1} . It is quite common for a lichen to have a lifespan of several centuries if left undisturbed and with a suitably long-lived substrate. In upland/ alpine ecosystems, lichens represent a significant proportion of overall species richness and vegetation biomass. Lichens play an important role in ecosystem

functions, e.g. biogeochemical cycling and carbon storage (Curtis et al 2005, Cornelissen et al 2007).

Air pollution in the recent years has become a serious problem not only in developed countries, but currently it raised as a major global environmental issue mainly due to the increased fossil fuel consumption in uncontrolled and non planning manner. Moreover, the lack of proper planning to implement mitigation control measures is also a hurdle in management of air pollution. Although, the various methods used to control air pollution provide accurate and reliable data, the instruments required for such assays are expensive and cannot provide monitoring at high intensity levels across large areas at different locations. Therefore, the forecast of air pollution is one of the safe and timely measures. Numbers of physical/chemical monitoring tools, available for motoring air quality are apart not only expensive but too time consuming. Bio-indicators, in this context are one of the best, inexpensive and natural agents, forecasting the presence of pollutants in air. Lichens, the natural symbiotic organism found in almost every habitat express their growth with changed environmental conditions. Hence it can be used as pollution indicators besides of their important ethno-botanical folk uses.

Basically, lichens depend on atmospheric moisture - rain, fog and dew for growth. There are slow in growth and very sensitive towards the changing environmental conditions. Since, they absorb water and essential nutrients from atmosphere instead of from soil, hence they respond in altered manner to increased concentrations of pollutants in air. Comparison of lichens growth in polluted and healthy environment, a clear cut change in growth as well as addition or reduced growth can be observed. A number of lichens have been studied for

monitoring and quantification of diverse atmospheric pollutants (Table-1 and 2). Species of *Lecanora*, *Candelariella*, *Dirinaria*, *Buelia*, *Laurera*, *Lecanora*, *Trypethelium*, *Graphis*, *Cryptothecia* are some of the examples of lichens indicates presence of pollutants in air. Compared with most physical/chemical monitoring tools, they are inexpensive to use in evaluating air pollution. Lichens have ability to bind toxic elemental pollutants and radioactive metals with their fungal mycelium where they concentrate them over time. Hence, they can also be used as important bio monitors to study concentrations of toxic elemental and radioactive metal pollutants in air. Lichens are equivalent to an early warning 'canary' for chemically sensitive vascular plants. In Europe lichens have been used as sensitive bioindicators of air quality for more than a century. As with most vegetation, lichens show a range of sensitivities to pollutants. Not all lichens are sensitive to a particular pollutant, some can be remarkably tolerant. Among lichens are species that are sensitive to sulphur, nitrogen, acidity, halogens (e.g. fluoride), heavy metals and ozone.

Table 1 : Some lichens indicative of different levels of pollution

Highly Polluted	<ul style="list-style-type: none"> • <i>Hypogymnia physodes</i> • <i>Xanthoria parietina</i> • <i>Lecanora dispersa</i> • <i>Diploicia canescen</i>
Moderately Polluted	<ul style="list-style-type: none"> • <i>Evernia prunastri</i> • <i>Foraminella ambigua</i> • <i>Lecanora chlorotera</i> • <i>Ramalina farinacea</i>
Slightly Polluted	<ul style="list-style-type: none"> • <i>Parmelia caperata</i> • <i>Graphis scripta</i> • <i>Bryoria fuscescens</i> • <i>Physconia distorta</i>
Minimal / No Pollution	<ul style="list-style-type: none"> • <i>Usnea subfloridana</i> • <i>Parmelia perlata</i> • <i>Degelia plumbea</i> • <i>Ramalina fraxinea</i>

Table 2 : Lichens as bio-Indicators for monitoring and quantification of different air pollutants

Air pollutants	Lichens (as bio-indicators)	Air pollutants	Lichens (as bio-indicators)
Cd	<ul style="list-style-type: none"> • <i>Anaptychia ciliaris</i> • <i>Lobaria pulmonaria</i> • <i>Ramalina farinacea</i> • <i>Centraria islandica</i> 	Ni	<ul style="list-style-type: none"> • <i>Ramalina duriaei</i> • <i>Cladina stellaris</i> • <i>Centraria islandica</i> • <i>Umbilicaria muhlenbergii</i>
Cr	<ul style="list-style-type: none"> • <i>Ramalina lacera</i> • <i>Parmelia sulcata</i> • <i>Centraria islandica</i> 	SO ₂	<ul style="list-style-type: none"> • <i>Pleurococcus viridis</i> • <i>Lecanora conizaeoides</i> • <i>Lecanora chlarotera</i> • <i>Lepraria incana</i> • <i>Hypogymnia physoides</i> • <i>Parmelia saxatilis</i> • <i>Parmelia sulcata</i> • <i>Parmelia caperata</i> • <i>Parmelia reticula</i> • <i>Parmelia reticulate</i> • <i>Lecidia scalaris</i> • <i>Lecidia expellens</i> • <i>Parmeliopsis ambigua</i> • <i>Evernia prunastri</i> • <i>Graphis elegans</i> • <i>Pseudevernia furfuracea</i> • <i>Usnea subfloridana</i> • <i>Usnea certain</i> • <i>Usnea florida</i> • <i>Usnea articulate</i> • <i>Lobaria pulmonaria</i> • <i>Sticta limbata</i>
Cu	<ul style="list-style-type: none"> • <i>Anaptychia ciliaris</i> • <i>Lobaria pulmonaria</i> • <i>Ramalina farinacea</i> • <i>Ramalina duriaei</i> • <i>Ramalina lacera</i> • <i>Parmelia sulcata</i> • <i>Centraria islandica</i> • <i>Umbilicaria muhlenbergii</i> 		
Fe	<ul style="list-style-type: none"> • <i>Anaptychia ciliaris</i> • <i>Lobaria pulmonaria</i> • <i>Ramalina farinacea</i> • <i>Ramalina lacera</i> • <i>Parmelia sulcata</i> • <i>Cladina stellaris</i> • <i>Centraria islandica</i> • <i>Umbilicaria muhlenbergii</i> 		
Mn	<ul style="list-style-type: none"> • <i>Anaptychia ciliaris</i> • <i>Lobaria pulmonaria</i> • <i>Ramalina farinacea</i> • <i>Ramalina lacera</i> • <i>Parmelia sulcata</i> • <i>Cladina stellaris</i> • <i>Centraria islandica</i> 		
Pb	<ul style="list-style-type: none"> • <i>Anaptychia ciliaris</i> • <i>Lobaria pulmonaria</i> • <i>Ramalina farinacea</i> • <i>Ramalina lacera</i> • <i>Cladina stellaris</i> • <i>Centraria islandica</i> 		
Zn	<ul style="list-style-type: none"> • <i>Anaptychia ciliaris</i> • <i>Lobaria pulmonaria</i> • <i>Ramalina farinacea</i> • <i>Parmelia sulcata</i> • <i>Cladina stellaris</i> • <i>Centraria islandica</i> 		

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Silk Milk - A Value Addition to Sericulture

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Sericulture is the process of silk production through cultivation of mulberry. Cultivation of mulberry in one acre of land by accommodating 5555 plants per acre and generating a revenue of >2.25 lakhs/acre/year. Seri-farming is recognised as the most potential foliage generating farming for silkworm rearing with enumerated fodder resources such as farm residues i.e. leftover, rejected leaf, hoots and grass and rearing bed residues generated as by-products of sericulture. Adoption of cattle in the seri-farming as a phenomenal process of silk-milk farming is not only found advantageous in sericulture but also resulting in offering additional gain to the sericulturists.

Sericulture, the process of silk production through cultivation of mulberry, rearing of silkworms and reeling of cocoons is a major agro-based labour-oriented cottage industry practiced by the major farming community of India. Mulberry (*Morus* spp.), a perennial plant cultivated as seasonal crop by training for its foliage to feed silkworm for the production of cocoons.



Pictures : Mulberry in perennial habit and trained mulberry garden for seasonal harvest

Cultivation of mulberry in one acre of land by accommodating 5555 plants/acre and generating a revenue of >2.25 lakhs/acre/year, respectively by involving

all their family members (male and female) for their lively hood is the most adopted method of sericulture in the monsoon dependent regions of Maharashtra. It is a matter of fact that, day by day cattle population is reducing due to non availability of fodder under prevailing drought conditions, increased drudgery in taking care of them leading to severe shortage of milk and meat also causing acute shortage of organic manures generated through the bovine population. Keeping the above in view, in recent past, several non-governmental organizations (NGOs) and even horticultural and sericulture departments of state government etc. are promoting and encouraging the sericulturists to adopt cattle such as cows, sheep and goats as allied avocation with sericulture because seri-farming is recognized as the most potential foliage generating farming for silkworm rearing with enumerated fodder resources such as farm residues (leftover, rejected leaf, hoots and grass) and rearing bed residues generated as by-products of sericulture. Further, they are also extending support by providing cattle on free of cost to grow in their mulberry farms grazing the mulberry farm waste for their benefit in addition to mulberry. However, farming community is in the impression of procuring grass and fodder and taking them for grazing to distant barren lands. This is not only hectic task but also an

unavailable avocation due to non availability of sufficient grass in the acute drought spell conditions. But slowly sericulturists are realising that seri farming is the best solution for easy maintenance of the same. Grazing of the cow and sheep has become easy as because mulberry fields provide frequent and constant mulberry leaf, leftover leaf shoots in gardens, rejected and unsuitable leaf for silkworm rearing bed too provides sufficient fodder to the farm animals. Therefore, maintaining at least two cattle selling milk to dairy farms farmers are earning more than 2.16 lakhs as an additional gain to mulberry. In addition to that every year the multiplication of cattle is inevitable leading to increase of bovine population and milk sale not only enhances their gain over sericulture but also supports their family members with constant milk production. Further, due to these cattle maintenance the sericulturists can generate their own farmyard manure (FYM) for farm use saving > Rs. 25,000/- on compost application.



Figure : Cattles grazing mulberry left over leaves after harvesting and rearing bed waste shoots

Advantages of silk-milk farming in sericulture

- In general NGO's and some of the horticulture and sericulture departments too offering cattle on free of cost to sericulturists for their additional livelihood.
- No additional expenditure requires for cattle maintenance and feeding purpose.

- Feeding or grazing of mulberry leaves along with seri-farm and rearing waste and grass yielding more milk than the other resources of feeding.



- No extra man power required to take them for grazing, no theft of the cattle as because they will remain in and around the vicinity of mulberry farm.
- Due to frequent grazing of the unwanted plants in and around the farm by the cattle leads to eco-friendly method of weed management.
- Due to removal of unwanted plant growth in mulberry farms due to grazing mulberry, plant nutrients removal by the weeds prevented.
- Due to the above occurrence of pest and disease incidents reduced and use of weedicidal application and expenditure on weed removal can be averted.
- Prevents contamination of spreading disease and pest leaves in and around farm and rearing and prevents rearing contamination due to cattle feeding of rearing waste.

Disadvantages due to adoption of silk-milk farming

- Excess feeding of mulberry leaves not only causes overheat leading to lose motions but also threat in abortion of pregnant cattle.
- Several farmers are not adopting bed disinfectants during rearing sacrificing rearing ethics, opining that bed waste will become unsuitable for cattle feed.

- Care to be taken by the sericulturists in avoiding the openly keeping naked electrical wires around rearing houses and bore wells to avert electrical shocks to cattle.
- Avoid creeping plants on electrical polls in the farm so as to cattle attempt to eat the same leads to electrical threats.



Therefore, by all the above it can be concluded that adoption of cattle in the seri-farming as a phenomenal process of silk-milk farming is not only found advantageous in sericulture but also

resulting in offering additional gain to the sericulturists. Moreover, silk-milk farming is going to open new avenues in promoting eco-friendly farming in sericulture and also enhances country's gain due to inordinate milk production witnessing a novel method of farming in sericulture for socio economic upliftment of the seri-culturists.

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... Message to Vidarbha Farmers

Don't commit suicide, accept silk-milk an eco-friendly and innovative method of sericulture

Insect World - The Social Insect Ant

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Ants are eusocial insects of the family Formicidae and along with the related wasps and bees belong to the order Hymenoptera. Ants evolved from vespoid wasp ancestors in the Cretaceous period, and diversified after the rise of flowering plants. More than 12,500 of an estimated total of 22,000 species have been classified. Ants have colonized almost every landmass on earth except Antarctica and a few remote or inhospitable islands such as Greenland, Iceland, parts of Polynesia and the Hawaiian Islands lack native ant species. There are 828 species of ants in India. Majority of the Indian public know about "black ants" and "red ants". They are also categorized into "ants that bite" and "those that don't". Usually, normal village household can hold up to 15 species while urban home can have 4 species of ants.

Ants are eusocial insects of the family Formicidae and along with the related wasps and bees belong to the order Hymenoptera. Ants appear in the fossil record across the globe in considerable diversity during the earliest part of the late Cretaceous suggesting an earlier origin. Ants evolved from vespoid wasp ancestors in the Cretaceous period, and diversified after the rise of flowering plants. More than 12,500 of an estimated total of 22,000 species have been classified. They are easily identified by their elbowed antennae and the distinctive node-like structure that forms their slender waists.

Ants have colonized almost every landmass on earth except Antarctica and a few remote or inhospitable islands such as Greenland, Iceland, parts of Polynesia and the Hawaiian Islands lack native ant species. Ants thrive in most ecosystems. Their success in so many environments has been possible due to their social organization and their ability to modify habitats, tap resources and defend themselves. Their long co-evolution with other species led to mimetic commensalism, parasitic and mutual relationship.

Evolution and classification - Ants belong to the family Formicidae, order Hymenoptera which also includes bees, wasps and sawflies. Ants evolved from a lineage within the stinging wasp and study

suggests that they are a sister group of the Apoidea (bees).

In 1966, E. O. Wilson and his colleagues identified the fossil remains of an ant that lived in the Cretaceous period. The specimen, trapped in amber dating back to around 92 million years ago, has features found in some wasps, but not found in modern.

A 2006 study suggested that ants arose tens of millions of years earlier than previously thought, up to 168 million years ago. After the rise of flowering plants about 100 million years ago they diversified and assumed ecological dominance around 60 million years ago ants was possibly a ground forager.

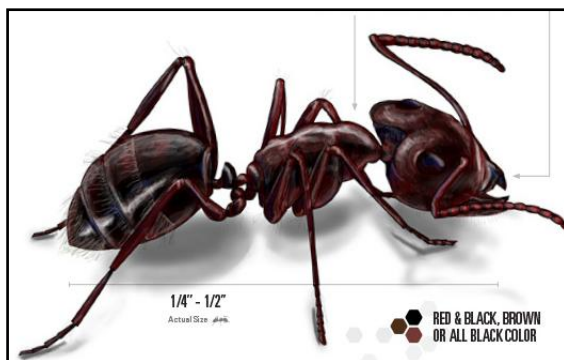
More than 12,000 species are currently known (with upper estimates of the potential existence of about 22,000) with the greatest diversity in the tropics.

Region	Number of species
Polynesia	42
Neotropics	2,162
Nearctic	580
Melanesia	275
Europe	180
Australia	985
Asia	2,080
Africa	2,500

Kingdom	Animalia
Phylum	Arthropoda
Class	Insecta
Order	Hymenoptera
Super family	Formicoidea
Family	Formicidae

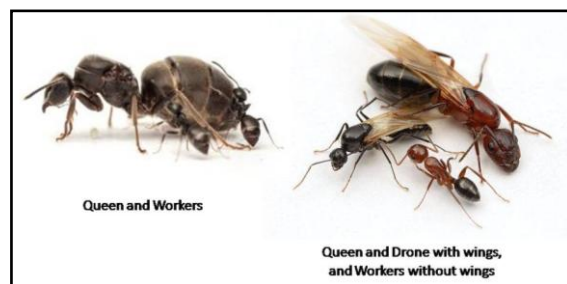
Morphology - Ants consist the head, thorax and abdomen are the three distinct body segments. The petiole forms a narrow waist between their thorax and abdomen. The petiole may be formed by one or two nodes (the second alone or the second and third abdominal segments).

Ants range in size from 0.75 to 5.2 cm, the largest species being the fossil *Titanomyrma giganteum*, queen of which was 6 cm long with a wingspan of 15 cm. Ants vary in colour; most ants are red or black, but few species are green and some tropical species have a metallic luster.



Social organization of ants - Ants are social insect form colonies that range in size from a few dozen predatory individuals living in small natural cavities to highly organized colonies that may occupy large territories and consist of millions of individuals. Larger colonies consist of various castes of sterile, wingless females, most of which are workers (ergates), soldiers (dinergates) and other specialized groups. Nearly all ant colonies also have some fertile males called "drones" (aner) and one or more fertile females called "queens" (gynes). The colonies are described as super organisms

because the ants appear to operate as a unified entity, collectively working together to support the colony. Ant societies have division of labour, communication between individuals, and an ability to solve complex problem. Their ability to exploit resources may bring ants into conflict with humans; however, as they can damage crops and invades buildings. Some species such as red fire ants (*Solenopsis invicta*) are regarded as invasive species, establishing themselves in areas where they have been introduced accidentally.



Reproduction and life cycle - A wide range of reproductive strategies have been noted in ant species. Females of many species are known to be capable of reproducing asexually through Thelytokous parthenogenesis. Secretions from the male accessory glands in some species can plug the female genital opening and prevent females from re-mating. Most ant species have a system in which only the queen and breeding females have the ability to mate. Contrary to popular belief, some ant nests have multiple queens, while others may exist without queens. Workers with the ability to reproduce are called "Gamergates" and colonies that lack queens are then called Gamergate Colonies; colonies with queens are said to be Queen-Right.

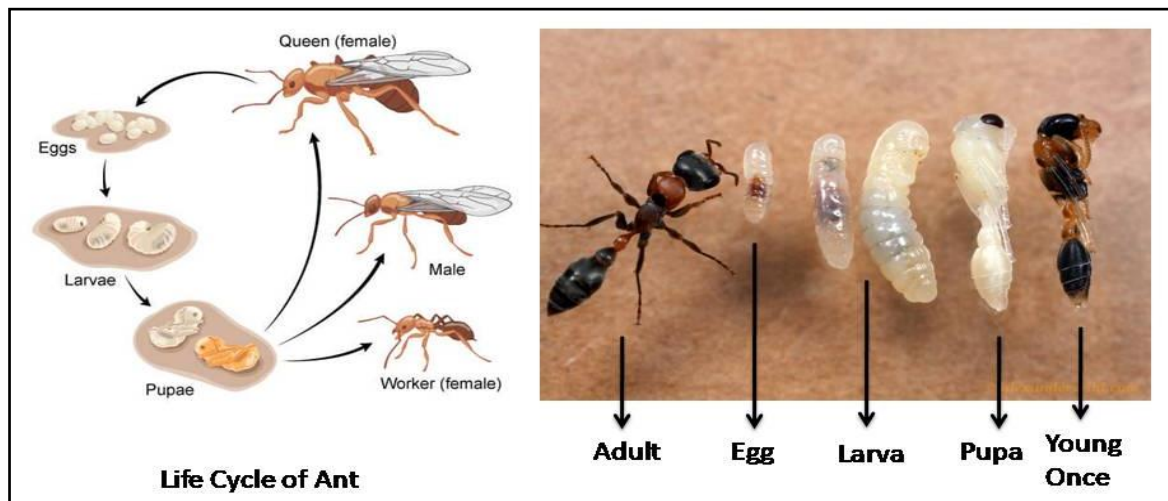
Drones can also mate with existing queens by entering a foreign colony. When the drone is initially attacked by the workers, it releases a mating pheromone. If recognized as a mate, it will be carried to the queen to mate. Males may also patrol the nest and fight others by grabbing them

with their mandibles, piercing their exoskeleton and then marking them with a pheromone. Marked male is interpreted as an invader by worker ants and is killed.

Ant shows haplo-diploidy sex determination. The life of an ant starts from an egg. If the egg is fertilized, the progeny will be female (diploid) if not, it will be male (haploid). Ants develop by complete metamorphosis (holometabolus) with the larva stages passing through a pupal stage before emerging as an adult.

The larva is largely immobile and is fed and cared for by workers.

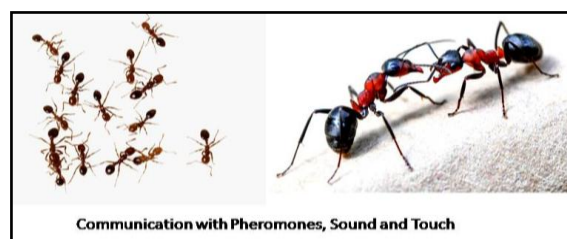
Ant colonies can be long-lived. The queens can live for up to 30 years, and workers live from 1 to 3 years. Males are quite short-lived and surviving for only a few weeks. Ant queens are estimated to live 100 times as long as solitary insects of a similar size. Ants are active all year long in the tropics, but, in cooler regions, they survive the winter in a state of dormancy known as hibernation i.e. winter sleep.



Communication - Ants communicate with each other using pheromones, sounds and touch. The use of pheromones as chemical signals is more developed in ants, such as the red ant, than in other hymenopterans groups. Like other insects, ants perceive smells with their long, thin and mobile antennae. The paired antennae provide information about the direction and intensity of scents. Since most ants live on the ground, they use the soil surface to leave pheromone trails that may be followed by other ants. In species that forage in groups, a forager that finds food marks a trail on the way back to the colony; this trail is followed by other ants, these ants then reinforce the trail when they head back with food to the colony. When the food source is exhausted, no new trails are marked by returning ants and the scent slowly dissipates. This behavior helps ants

deal with changes in their environment. For instance, when an established path to a food source is blocked by an obstacle, the foragers leave the path to explore new routes. If an ant is successful, it leaves a new trail marking the shortest route on its return. Successful trails are followed by more ants, reinforcing better routes and gradually identifying the best path.

Some ants produce sounds by stridulation, using the body segments and their mandibles. Sounds may be used to communicate with colony members or with other species.



Social behavior - Ants form symbiotic associations with a range of species, including other ant species, other insects, plants and fungi. Some arthropod species spend part of their lives within ant nests. Aphids and other hemipteran insects secrete sweet liquid called honey dew, when they feed on plant sap. The sugars in honeydew are a high energy food source, which many ant species collect. In some cases, the aphids secrete the honeydew in response to ants tapping them with their antennae. The ants in turn keep predators away from the aphids and will move them from one feeding location to another. When migrating to a new area, many colonies will take the aphids with them, to ensure a continued supply of honeydew. Ants also tend mealy bugs to harvest their honeydew. Mealybugs may become a serious pest of pineapples if ants are present to protect mealybugs from their natural enemies.

Types of ants found in India - There are 828 species of ants in India. Majority of the Indian public know about "black ants" and "red ants". They are also categorized into "ants that bite" and "those that don't". Usually, a normal village household can hold up to 15 species while urban home can have 4 species of ants.

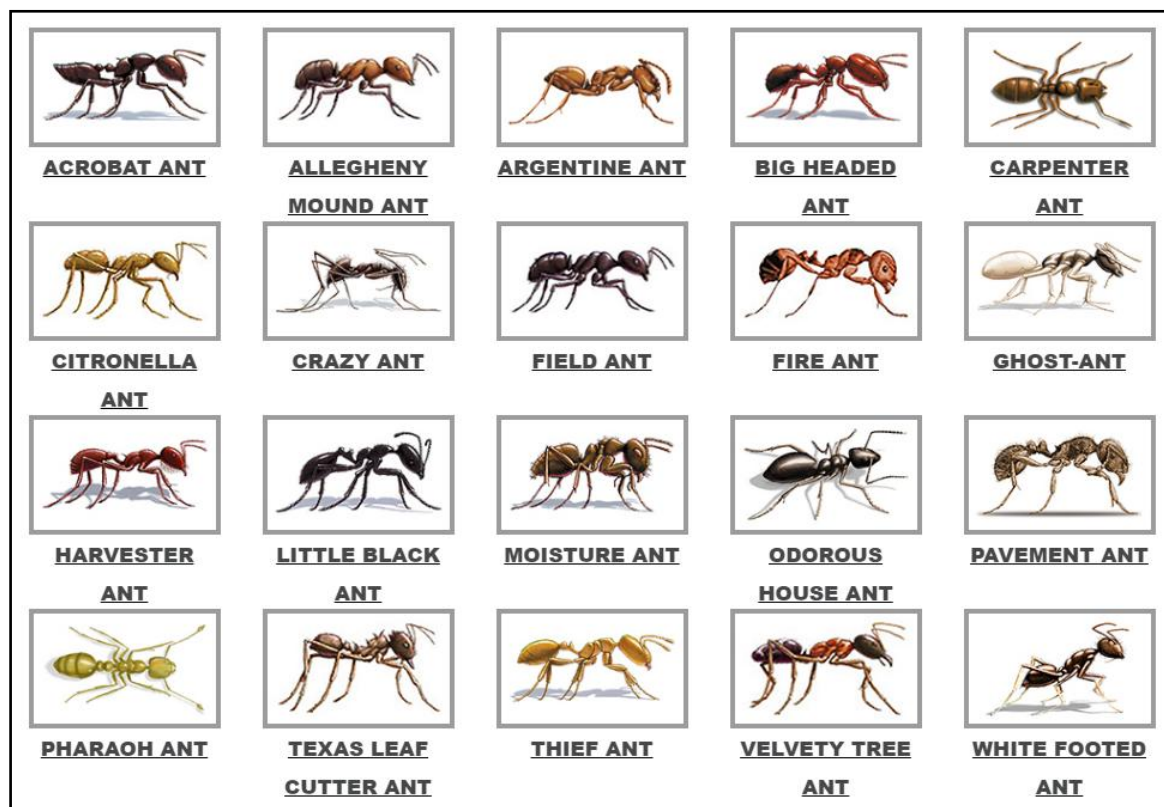
- **Little black ant (*Monomorium minimum*)** - These ants found everywhere in India. They have the shiny black body. The workers have a length of 1 to 2 mm, while the queens are 4 to 5 mm in length. The colonies of these black ants have many queens. They have a tendency to grow to large numbers within short time. These ants are normally located outside house, in woodwork or in building cracks. They feed on left over foods and sweets. They can definitely invade house in search of food and move at a fast pace. When in scarcity, they can also feed on dead insects.
- **Argentine ant (*Linepithema spp*)** - The colour comes to light to dark brown.

Workers have the length of 0.12 to 0.8 inches. These ants build the nests in places such as moist soil and plants. Their main source of food is fruit juice, syrup, sugar and honeydew.

- **Odorous house ant (*Tapinoma sessile*)** - Their body colour is black or brown. Worker body is 1/16 to 1/8 inch long. They can live for many years. Their nests can found in places of moisture. They also called as "house" ant. They feed on many household foods such as sweets and fruits.
- **Pharaoh's ant (*Monomorium pharaonis*)** - Males of this species are long and black, the queens have the color of dark red. Every colony has many queens. A queen can produce nearly 3500 eggs during its entire lifecycle. Prefer humid conditions and are usually found in hospitals and offices. High protein foods are the main focus - dead insects, fats and meat.
- **Crazy ant (*Paratrechina longicornis*)** - They are dark brown and have the size of 2.5 to 3 mm. They can invade habitats of new ants and make the place their own. Many ants come as unwelcome guests to our home for food. They can feed on many household foods such as sweets and fruits. Some of the common types of ants found in India are yellow crazy ant (*Anoplolepis gracilepis*), black crazy ant (*Paratrechina longicornis*).
- **Fire ant (*Solenopsis spp*)** - The head and body are coppery brown in colour with a darker abdomen. Queen is 5/8" long and worker is 1/8"-1/4" long. They are feed on dead animals, insects, earthworms and vertebrates. If aggravated, these react aggressively and can inflict a painful sting. These ants are a major agricultural and urban pest, destroying crops and invading residential areas both outdoors, indoors.
- **Carpenter ant *Camponotus pennsylvanicus*** - Blackish colour most common but can also be black and red. Worker is 1/4" long and queen is 1/2" long. They found in both moist and dry wood, but

prefer moist e.g. wood dampened by water leaks. They search food mainly at night but also during the day in early spring / summer. They primarily feed on honeydew; also eat plant secretions, fruit

juices and insect remains. They do not eat wood. In homes they are attracted to sweet substances, fats, grease and meats. They rarely come into contact with people and do not sting.



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The Future of Nanotechnology in Medicine

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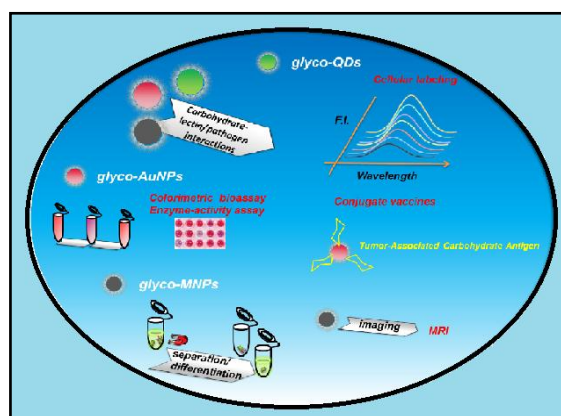
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Nanotechnology is used to create many new materials and devices with a vast range of applications such as in nano-medicines, nano-electronics, biomaterials and energy production and consumer products. Lipid based nano-capsulation systems are useful in increase the performance of antioxidant just by improving their solubility. Dialdehyde starch nanoparticles are useful carrier for anticancer drug because of their small size, good thermal stability, low biological toxicity and slowly anticancer drug releasing to strengthen drug effect. Many carbohydrate derivatives act as scavengers against reactive oxygen. Carbohydrate antigen coated gold nanoparticles shows antitumor properties.

Nanotechnology as defined by size is naturally very broad, including fields of science as diverse as surface science, organic chemistry, molecular biology, semiconductor physics, energy storage, micro fabrication, molecular engineering, etc. The associated research and applications are equally diverse, ranging from extensions of conventional device physics to completely new approaches based upon molecular self-assembly, from developing new materials with dimensions on the nanoscale to direct control of matter on the atomic scale. Nanotechnology may be able to create many new materials and devices with a vast range of applications such as in nano-medicines, nano-electronics, biomaterials and energy production and consumer products.

Lipid based nano-capsulation systems are useful in the properties of antioxidant. It increases the performance of antioxidant just by improving their solubility. Antioxidants protect our body against age related and chronic diseases. When antioxidants are given in their free form, they cannot pass cell membranes so can easily cleared from general circulation that's why lipid based nano-capsulation system is useful¹. Dialdehyde starch nanoparticles are useful carrier for anticancer drug because of their small size, good thermal stability, low biological toxicity and slowly anticancer drug releasing to strengthen drug effect².

Emerging nanotechnologies have great significance in many neurological diseases and brain tumours. The nano-medicines are able to transport non-invasively highly potent and specific drugs across the blood brain barrier. Due to natural origin, biocompatibility, biodegradability and their hydrophilic nature, carbohydrates plays an important role to act as drug carrier³. Carbohydrates and glycoconjugates play an important role in diagnostic processes like recognition of antigens, cells and their fragment⁴. Magnetic nanoparticles are useful in drug delivery and sensing system. Besides above applications they can also used in treatment of cancer in hyperthermia⁵. Many carbohydrate derivatives act as scavengers against reactive oxygen⁶. Carbohydrate antigen coated gold nanoparticles shows antitumor properties⁷.



One attractive potential application of glycosylated nano materials is as targeted delivery vehicles, which improve

pharmacokinetic profiles of therapeutics. The most frequently employed approach is to incorporate galactose residues to target the liver via the asialoglycoprotein receptor, which normally functions to recycle degradable red blood cells and can hence internalise macromolecules⁸⁻⁹.

Adak et al. (2015) gives various applications of glycosylated nanoparticles like for binding assays for the lectins and protein toxins. The multivalent glyco-nanoparticles can be used as probes for the detection and capturing of bacterial pathogens and to decontaminate them as nanoprobe for targeting and labelling cells as synthetic vaccine candidates and glyco-gold nanoparticles as a probe for assaying the bond formation of glycosyltransferase¹⁰.

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Cardio-Pulmonary Resuscitation (CPR)

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Cardiac arrest is one of the common causes of cardio-respiratory failure. Cardiac arrest is synonymous with the term sudden death. Prompt action is vitally important for CPR. The three cardinal signs of cardiac arrest are apnoea absence of carotid, femoral pulse and dilated pupils. CPR technique is used in persons whose respiration and circulation of blood have suddenly and unexpectedly stopped. Sequence of CPR is ABC i.e. airway, breathing and circulation.

Resuscitation includes all measures that are applied to revive patients who have stopped breathing suddenly and unexpectedly due to either respiratory or cardiac failure. Cardiac arrest is one of the common causes of cardio-respiratory failure. Cardiac arrest is synonymous with the term sudden death; it means that the victims, heartbeat, circulation of blood, and respiration have suddenly and unexpectedly stopped. Prompt action is vitally important for CPR. When a person stops breathing spontaneously, his heart also stops beating. Clinical death has occurred. Within 4 to 6 minutes, the cells of the brain, which are sensitive to the paucity of oxygen, begin to deteriorate. If the oxygen supply is not restored, the patient suffers irreversible brain damage and biological death occurs.

Three cardinal signs of cardiac arrest are apnoea absence of carotid, femoral pulse and dilated pupils. Sequence of CPR is A - Airway, B - Breathing, C - Circulation.

In a cardiac arrest, the airway is established first then breathing is assisted and finally, circulation is restored. If there are two nurses, both breathing and circulation can be started simultaneously.

CPR technique is used in persons whose respiration and circulation of blood have suddenly and unexpectedly stopped. There is no attempting of CPR techniques in patients who are in the last stage of an incurable illness and in those persons whose heartbeat and respiration have been absent for more than 6 minutes.

Immediate responsibilities of resuscitator

- To recognize the sign of cardiac arrest.
- Protect the patient's brain from anoxia by immediately starting the artificial ventilation of the lungs and external cardiac massage.
- Call for the help.

CPR must be initiated within 3 to 4 minutes in order to prevent permanent brain damage.

Steps of procedures	Reasons
A. To maintain airway clear	
<ol style="list-style-type: none"> 1. Clear the airway of obvious foreign matter through vomits, secretions etc. 2. Hyper re-extend the head and neck of the patient by tilting it backward as far as possible. 3. Pull the victims jaw forward by placing the fingers behind the angle of the haw until the teeth on the upper haw and the lower haw are approximated. 	<ul style="list-style-type: none"> • Clearing airway obstruction may restore the respiration and circulation. • Keeping the head and neck in a hyper-extended position prevents the tongue falling back and obstructing the airway. • Helps to keep the airways open and prevents falling back of the tongue.

<p>4. With the above steps if breathing is restored, place an oro-pharyngeal airway. If breathing is not restored, start artificial ventilation.</p>	<ul style="list-style-type: none"> • Placing an oro-pharyngeal airway helps to keep the airway patent. It also prevents biting of the tongue should the patient develop a fit.
<p>B. To initiate breathing (mouth to mouth breathing)</p>	
<ol style="list-style-type: none"> 1. Maintain the position of the head as discussed. 2. Pinch the patients nostrils, closing them using index finger and thumb. Take a deep breath, place your widely opened mouth over the patient's mouth and blow forcefully enough to make the patient's chest rise. Turn your face towards the patient's chest to observe, its expansion 3. After each inflation move your mouth away from patient mouth 4. Repeat inflation 12 to 20 times per minute at the rate of one inflation every three to five second, until the patient breath spontaneously. In children, less volume of air is introduced, but they are given about 20 to 30 times per minute 	<ul style="list-style-type: none"> • To keep airway clear. • Closing the nostrils with fingers and enclosing the patient's mouth into the rescuers mouth ensures airtight seal. The expansion of the chest ensures ventilation of the lungs. In children, the rescuers mouth is placed over the mouth and nose. • To allow air to escape when the patient exhales and for you to inhale. • The inflation of the lungs should correspond to the normal respiration.
<p>C. To maintain circulation</p>	
<ol style="list-style-type: none"> 1. Begin external cardiac compression immediately following initial four rapid breaths. 2. Position the patient on his back on a flat firm surface. 	<ul style="list-style-type: none"> • Tissue hypoxia will cause irreversible damage if an adequate circulation is not restored within 3 to 4 minutes. An artificial circulation is possible because the heart lies between sternum and vertebrae. Pressure on the sternum squeezes the heart against the spine, forcing blood out of the heart into the aorta, thus initiating circulation. • If the bed is staging, it is difficult to evaluate the amount of sterna pressure exerted during each compression.

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Worldwide COVID-19

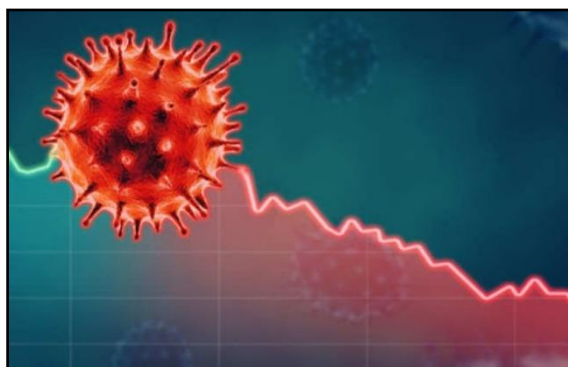
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Corona viruses are a large family of viruses that are common in many different species of animals. It is a new respiratory virus that was first identified in Wuhan, Hubei region, China, which has been infecting people. Common signs of infection include respiratory symptoms like fever, cough, shortness of breath, and breathing difficulties. Symptoms may appear in as few as 2 days or as long as 14 after exposure. The disease is called COVID-19.

According to the Centers for Disease Control and Prevention (CDC) trusted source, "corona viruses are a large family of viruses that are common in many different species of animals". However, this most current stress that it is a new respiratory virus that was first identified in Wuhan, Hubei region, China, which has been infecting people.

The World Health Organization trusted source says that common signs of infection include respiratory symptoms like fever, cough, shortness of breath, and breathing difficulties. Symptoms may appear in as few as 2 days or as long as 14 after exposure.



The new corona virus disease outbreak initially identified in China, is continuing to grow. The disease is called COVID-19 and is caused by infection from the new corona virus, SARS-CoV-2, which is one of multiple corona viruses that can infect humans. Other examples include SARS, MERS and even the common cold.

Symptom - COVID-19 symptoms range from mild to severe. It takes 2 to 14 days after exposure for symptoms to develop.

Symptoms may include fever, cough and shortness of breath. Those with weakened immune systems may develop more serious symptoms, like pneumonia or bronchitis. You may never develop symptoms after being exposed to COVID-19. So far, most confirmed cases are in adults, but some children have been infected. There is no evidence that children are at greater risk for getting the virus.

Prevention - Practice social distancing. Avoid people who are sick or meeting in large groups. Stay home if you are sick. Cover your cough with a tissue or cough into your upper sleeve or elbow. Do not cough into your hands. Wash your hands often with soap and water for at least 20 seconds.

Infection - It is spread by come in contact with infected people. In order to stop the spread of the Covid-19 outbreak, many countries across the world have started implementing very tough measures. Countries and world capital have been put under strict lockdown, bringing a total halt to major industrial production chains.

The corona virus outbreak, which originated in China, has infected large number of people. Its spread has left businesses around the world counting costs. The travel industry has been badly damaged, with airlines cutting flights and tourists cancelling business trips and holidays. Governments around the world have introduced travel restrictions to try to contain the virus. The effects of lockdowns are visible.

Vaccination - Scientists around the world are working on potential treatments and vaccines for the corona virus disease known as COVID-19. Several companies are working on antiviral drugs, some of which are already in use against other illnesses, to treat people who already have COVID-19. Other companies are working on vaccines that could be used as a preventive measure against the disease. It will probably take months, if not more than a year, for a drug or vaccine to complete clinical trials and be available to the public.



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Handmade Hand Sanitizer

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With concern to COVID-19, during recent weeks the sale of hand sanitizer has increased much more. In order to kill the germs we need the sanitizers which contains 60% to 95% alcohol. Sanitizers work best to the clean hands effectively. Here some common methods for preparation of handmade hand sanitizer are discussed along with proper directions, instructions and hand washing tips.

During recent weeks, with concern to COVID-19, the sale of hand sanitizer has jumped to about 75% higher than it was at this time. In pinch, could handmade hand sanitizer do the job? Possibly, but you have to use right method. It is important to note that hand sanitizer is not the only way. Frequent and thorough hand washing with soap for at least 20 seconds is the best method for reducing hand germs and crumbing disease transmission.

The alcohol sanitizers lead those products because of their microbe bursting properties. In order to kill the germs we need the sanitizers which contains 60% to 95% alcohol. Sanitizers work best to the clean hands effectively.

Methods - Following are some common methods for preparation of handmade hand sanitizer.

- **WHO method** - For local production in parts of world, where sanitizers are mostly needed, the solution with much higher alcohol content is required. It is a mixture made of 35 cup (8333 ml) of 96% ethanol, 0.6 cup (145 ml) of 98% glycerol and 1.7 cup (417 ml) of 3% hydrogen peroxide (to reduce the bacterial contamination of sanitizer).
- Mixture of 3/4 cup of isopropyl alcohol (99%), 1/4 cup of aloe vera gel (to keep hands smooth and to counteract harshness of alcohol) and 10 drops of essential oil like lavender / coconut oil or lemon juice.
- 2 Parts of isopropyl alcohol (91-99%), 1 part of aloe vera and few drops of clove, eucalyptus and peppermint.

Directions - Use the directions given below.

- Pour all ingredients into bowl ideally one with a pouring spout like glass measuring cylinder.
- Mix with spoon and then beat with whisk to turn the sanitizer into gel.
- Pour ingredients into an empty bottle for easy to use.



Instructions - Follow the given instructions.

- Make the hand sanitizer in clean space. Wipe down counter tops with a diluted bleach solution beforehand.
- Wash your hand thoroughly before making hand sanitizer.
- To mix, use the well washed clean spoon and whisk.
- Make sure, alcohol used is not diluted.
- Mix all ingredients thoroughly until they are well blended.
- Do not touch mixture with hand directly until it is ready to use.

Hand washing - This is a better method for avoiding germ. Sanitizers should be applied to complete hand surface and rubbed for

about 20 seconds until it dry. For hand washing one should follow 5 steps.



- Wetting the hand.
- Lathering soap (covering back of hands, nail, between fingers).

- Scrubbing all surface for 20 seconds.
- Rinsing with clean water.
- Drying with clean towel.

Sanitized the hands throughout the day, especially after coughing, sneezing, before eating, after using restroom. If a sneeze suddenly comes and tissue is not available, bend down and sneeze or cough into crook your elbow.

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. . . be clean and safe

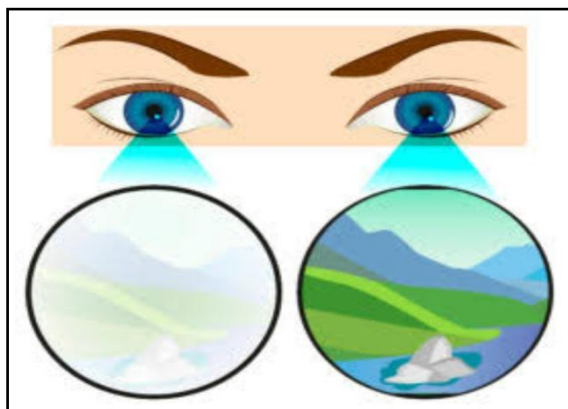
Amblyopia Due to Mobile Addiction - A Threat to Society

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Amblyopia is called lazy eye. It is a disorder of sight in which the brain fails to process inputs from one eye and over time it favours other eye. Due to mobile addiction, thousands of children found affected of lazy eye. Its causes include muscle imbalance (strabismus amblyopia), difference in sharpness of vision between eyes (refractive amblyopia), cloudy area in cataract of one eye (deprivation) etc. Amblyopia can be prevented by early detection, proper treatment and avoiding overuse of mobile especially during low light in night time.

What is Amblyopia? It is called lazy eye. It is a disorder of sight in which the brain fails to process inputs from one eye and over time it favours other eye. It results in decreased vision in an eye that otherwise typically runs normally. It is most common cause of decreased vision in a single eye among children, youngsters and adults. Thousands of children were found affected because of the lazy eye due to mobile addiction.



Symptoms - It includes,

1. An eye wanders inward or outward.
2. Eyes that appear not to work together.
3. Poor depth perception.
4. Squinting or shutting eye.
5. Head tilting.
6. Abnormal results of vision screening tests.

Causes - These are,

1. Muscle imbalance - The most common cause of lazy eye is an imbalance in the muscles that position the eyes. It is called as strabismus amblyopia. Imbalance can cause the eyes to cross in turn or out and prevents working together.

2. Difference in vision sharpness between eyes - A significant difference between prescriptions in each eye due to farsightedness or sometimes due to nearsightedness or an uneven surface curve of eye (astigmatism) can result lazy eye. It is called as refractive amblyopia.

3. Deprivation - A problem with one eye such as cloudy area in lens (cataract) can prohibit clear vision in that eye.

All above defects caused due to overuse of mobile i.e. late night mobile watch etc.

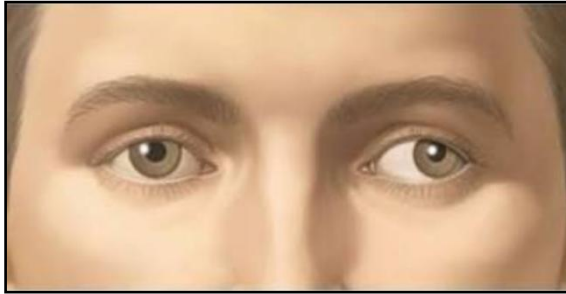
Diagnosis - It can be done by various tests.

1. Preverbal children - A light magnifying device is used to detect cataracts.
2. Children of 3 years and more age - Tests using pictures or letters can assess child's vision. Each eye covered in turn to test other.

Treatment - It is responsive in children if it starts between 7 to 17 years of age.

1. Corrective eyewear - Glasses or contact lenses can correct the problem.
2. Eye patches - To stimulate weaker eye you can wear an eye patch over the eye with better vision for 2 to 6 hours a day.
3. Bangerter filter - The special filter is placed on the eye glass of lens of stronger eye, filter blurs stronger eye and stimulate other eye.
4. Eye drops - An eye drop of a medication called atropine (isopto atropine) extracted from plant *Atropa belladonna* (in Italy belladonna means beautiful lady) can temporarily blur vision in stronger eye. It

dilates pupil muscles. It can be used daily or weekly but side effects have sensitivity to light, eye irritation.



5. Surgery - The surgical repairs are recommended to straighten/correct eye sight/vision. Activity based treatments such

as drawing, puzzles are also helpful is predicted but research is going on to prove it. Treatment might last for 1 to 2 years.

Prevention/Remedies - These include,

1. Amblyopia can be prevented by early detection and treatment taken properly.
2. Avoid overuse of mobile especially during low light in night time.
3. Some homemade remedies like the barefoot walking on grass in early morning, use of gulabjal and desi-ghee can be used.

References

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AVISHKAR - Student Research Convention Colour Coat Holders (2019-20)



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