

Next big marketing product- Natural Air Purifier

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Abstract—With pollution rising, needs are getting modulated, first it was water purifier and now its air purifier. Soon air purifier will be found in almost every home. This as of today is a distant thought but soon will be reality. In this paper a model is proposed which will help to increase the level of pure oxygen in air.

Keywords: *Oxygen producing plants, clean air plants, air cleaning plants, air purifying plants.*

I. INTRODUCTION

Oxygen and the air it is contained in, could be considered the most crucial nutrient to the human body because life can only last mere minutes without it. Every cell in the body uses oxygen for fuel (as well as glucose). Brain function quickly drops when it is not supplied with adequate oxygen. If it falls too low to quickly, a stroke can occur. Cancers and many pathogenic diseases are destroyed by oxygen, which is why hyperbaric oxygen chambers are used as such powerful lifesaving tools. These chambers can also reverse all the side effects of a stroke if a person who has just suffered from one is placed into one within an hour or so. Not only this, Our body get detoxifies approximately 70% through breathing. The major benefit of adding oxygen producing plants to your living and work space is an increase of productivity due to the maintenance of healthy oxygen levels in the blood.

Hence, the need of pure oxygen in the air is utmost important. But now the major issue is supply of oxygen is insufficient, infact it is found that the ratio of oxygen to other molecules in the earth's atmosphere has been dropping. The majority of this problem is due to air pollution increasing and less to the fact that the forests and jungles of the world are being reduced by clear cutting (which should still be stopped). Areas of higher pollution, such as cities, have a lower percentage of oxygen in the air.

II. POLLUTANTS AND THEIR EFFECTS

There are many pollutants that are released in the air which have many adverse effects on human health. Few are listed below [1]:

1. Carbon dioxide: Sources: Unvented gas and kerosene appliances, improperly vented devices, processes or operations produce combustion products, human respiration. Acute health effects: Difficulty in concentrating, drowsiness, increased respiration rate. At moderate concentrations, CO₂ can cause feelings of stiffness and discomfort. Respiration can be slightly affected at levels above 15,000 ppm (27430 mg/m³). Exposures above 30,000 ppm can lead to headaches, dizziness, and nausea. These concentrations also affect perception of motion. This

may be because CO₂ has been shown to moderate the activity of cells within the visual cortex.

2. Carbon Monoxide: Sources: Tobacco smoke, fossil-fuel engine exhausts, improperly vented fossil-fuel appliances, gas cooking, and water heaters. Acute health effects: Dizziness, headache, nausea, cyanosis, cardiovascular effects, fatigue, memory impairment, tinnitus and death. CO mostly effect young adults, reduces their concentration. CO is responsible for increased number of cardiovascular diseases in the society. Problem of 26.7% of hearing impairment due to presence of CO in offices increased and up to 78.3% for the patients already suffering from CO poisoning. CO have the ability to form COHb in some human up to 5 to 17%. COHb levels of between 50 and 60% can result in fainting and convulsions, whilst higher exposures can lead to coma and death. Hence, individuals with ischaemic heart disease are at particularly high risk.
3. Formaldehyde: Sources: Off-gassing from urea formaldehyde foam insulation, plywood, particle board, and paneling, carpeting and fabric, glues and adhesives, and combustion products including tobacco smoke. Acute health effects: Hypersensitive or allergic reactions, skin rashes, eye, respiratory and mucous membrane irritation, odor annoyance. Exposure to concentrations of less than 1 ppm (1.2 mg /m³) may result in sneezing, coughing, and minor eye irritation, although these symptoms often rapidly subside after the start of the exposure. Numerous studies show that formaldehyde vapor is also an irritant of the skin and the respiratory tract.
4. Volatile Organic Compounds (VCO): Sources: Volatile organic compounds include trichloroethylene, toluene, methyl ethyl ketone, alcohols, methacrylate, acrolein, polycyclic aromatic hydrocarbons, and pesticides products, asphalt and gasoline vapors, tobacco smoke, dried out floor drains, cosmetics and other personal products. Acute health

effects: Nausea, dizziness, mucous membrane irritation, headache, fatigue. A result from epidemiological research suggests that reactions between indoor ozone and VOCs may produce irritant substances that could cause SBS symptoms. At high concentrations, many VOCs are potent narcotics, and can depress the central nervous system. Exposures can also lead to irritation of the eyes and respiratory tract, and cause sensitization reactions involving the eyes, skin, and lungs. To back this up, a number of studies have reported a strong association between mucous membrane irritation, central nervous system symptoms, and total exposure to VOCs amongst office workers.

5. Synthetic Fibers: Sources: Fibrous glass and mineral wool. Acute health effects: Irritation to the eyes, skin and lungs, dermatitis.

III. AIR PURIFYING AND CLEANING PLANTS

Green oxygen producing plants are abundant in nature, especially in forests, jungles and coastal regions by the ocean. Plants like seaweeds, algae and marine phytoplankton make up the majority of the world's oxygen producing plants. The air that these plants provide are very refreshing and revitalizing. NASA Clean Air Study found that oxygen producing plants can be used to both produce oxygen as well as remove common harmful chemicals, that are harmful to human health, from the air and break them down into harmless organic by-products into the soil, which the plants then use as food [5]. These harmful chemicals are off-gassed from common household items and products like, synthetic carpets, toys, chemical cleaners, paint and furniture with synthetic components, which releases formaldehyde. Also petroleum products releases benzene.

Top three oxygen producing plants [5]:

1 Sprouts: If you grow your own sprouts for food (especially sweet pea sprouts, buckwheat sprouts and sunflower sprouts) you will have a fantastic mini greenhouse effect in your living space. You also get supplemental oxygen orally by eating raw, living greens.

2 Snake Plant: Of all the different oxygen producing plants, this one is unique since it converts a lot of CO₂ (carbon dioxide) to O₂ (oxygen) at night, making it ideal to have several in your bedroom. 6-8 waist high plants are needed per person to survive if there is no air flow (meaning you could live in a completely air sealed room if you had these plants and the Areca Palms present). The snake plant also removes formaldehyde from the air.

3 Areca Palm: This plant removes xylene and toluene from the air, but also happens to convert a lot of CO₂ to O₂ during the daytime. Having four (shoulder high plants) of these per person in your household provides enough oxygen to survive on during daylight hours. They need to have dust and grime wiped off of their leaves once a week, or as often as daily if you live in a city with very bad air quality such as Delhi.

Top three air cleaning plants [5]:

1 Madagascar Dragon Tree: It best removes benzene, formaldehyde, xylene and toluene from the air. It cannot tolerate direct sunlight yet it does well in fairly well indirectly light areas. It is more susceptible to becoming damaged from over watering than infrequent watering.

2 Warnock Dracaena: One of the most popular clean air plants, this one removes benzene, trichloroethylene, xylene and toluene from the air.

3 Peace Lily: This thrives best in the shade and with only roughly one watering per week, but never let the soil completely dry out. This easy to take care of house plant removes benzene, formaldehyde, acetone, ammonia and trichloroethylene from the air. It also periodically flowers.

The biggest benefit of incorporating these oxygen producing plants into lifestyle is going to be the improvement of air quality in home. But another side benefit is going to be the therapeutic effect of having more greenery around you. The colour green has a soothing, healing effect and considering that it is the predominant colour in nature, people have a natural inclination to feel the most at ease in settings that contain this colour. It is one of the great ways to deal with stress. Another useful addition to these clean air plants is to have several room air purifiers that are also negative ion generators. This will create a micro climate in your home that rivals that of even some natural settings.

IV. INDOOR PLANTS AS AIR PURIFIER

The amount of leaf surface area influences the rate of air purification by plants. Generally, the larger the plant leaf surface area, the higher the transpiration rate and the greater the surface area to absorb airborne chemicals [1].

Scientists estimate a safe oxygen consumption of 50 liters per hour for a human. Meanwhile, a leaf gives off about five milliliters of oxygen per hour. A person would need to be in a room with about ten thousand leaves. About 300 to 500 plants would produce the right amount of oxygen. Botanist, horticulturalist and ecologist use a factor called Leaf Area Index (LAI) to calculate theoretical photosynthetic capacity and primary production of different environments.

(LAI) = one sided leaf area / ground area m²/m²

A LAI of 8 is a very dense conifer forest, 6 is a old growth tropical rainforest, 4 is copse of oak trees and 3 potted cucumber plant.

Let us assume that there is an apartment with 600 sq.ft. of canopy. Now we have to factor in that the under canopy is not receiving as much light as the canopy top, in fact it could be as little as 10% of that at the top. Assuming that the integrated canopy is 50% efficient so we have the equivalent of 1.5-2 times the ground area of leaf surface area to provide oxygen needs.

900 to 1200 sq.ft. = 836,127 cm² to 1,114,836 cm² leaf area equivalent

So assuming approximately we get 0.5 ml of O₂ per hour / cm² of leaf area, we will get oxygen production of 418 L - 557 L per hour.

Below are images which show different ways of decorating home with these plants [6]:



Fig. 1 Money plant



Fig. 3 Snake Plant



Fig. Golly Pod Look



Fig. 2 Areca Palm

V. PRECAUTIONS TO BE TAKEN

The plants that are mentioned in this paper are all low maintenance ones. There are a few things we need to take care about, they are as follows:

1. Avoid placing them in corners with stagnant or no air flow or by radiators that produce excessive heat which can damage them.
2. Indirect sunlight is best for the air cleaning plants because they are mostly grow in the shade of growing

- jungle plants, but other types of flowering plants will usually need some direct sun.
3. Take them outdoors at least every couple of months for a day or two.
 4. Clean or dust their leaves about once a week, more often in a dirty city.
 5. Over-watering is more harmful than under-watering, allow the soil to get fairly dry between watering (except for the peace lily and your sprouts).
 6. Mist the leaves, since these are jungle plants that like humidity.
 7. Use an organic fertilizer on occasion such as diluted ocean water, seaweed extract and/or pour the soak water into the soil of your plants left over after germinating your nuts, seeds, grains, legumes and sprouting seeds.

VI. CONCLUSION

Technology is there to assist mankind but there has to be absolutely need as technology comes at a cost. The cost can be electric consumption, electronic waste, increase plastic parts etc. which will lead to severe pollution and in future will degrade the environment, endangering future generations. The idea proposed is simple, realistic and can be adopted by all classes of society thus saving large amount of moolah and safeguarding the environment. This method can be used by all type of economies across the globe as the plants proposed are universal hence easily adaptable.

REFERENCES

- [1] Amandeep Kaur and Anil Kumar Misra, "Impact of Indoor Surface Materials and Environment On Percieved Air Quality," Journal of Environment and Human, vol. I, no. I, 2014.
- [2] "Lifeforce"; by Dr. Brian Clement (Book Publishing Company, 2007)
- [3] en.wikipedia.org/wiki/List_of_air-filtering_soil_and_plants
- [4] "How Long Do You Choose to Live"; by Peter Ragnar (Roaring Lion Publishing, 2001)
- [5] www.ted.com/talks/kamal_meattle_on_how_to_grow_your_own_fresh_air.html
- [6] <http://www.home-designing.com/2010/09/indoor-plants-living-room-bedroom>