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EFFECT OF AGNIHOTRA FUMES ON AEROMICROFLORA

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ABSTRACT
Respiratory infections are the major cause of mortality and morbidity among the World population. Hence, with the view to control, the chemical fumigation is used as an adjunct to environmental cleaning of hospital rooms and other critical areas. However, chemical fogging possesses lots of hazardous effect and causes serious illness and death. The centers for Disease control and prevention (CDC) does not recommend chemical fogging to reduce air borne infections in routine patient care area. In contrast, Biofumigation is an effective, safe, inexpensive and ecofriendly technique for air disinfection. Hence, Focusing, on an ancient knowledge for disinfection of air, present study with the Agnihotra fumes on aeromicroflora of laboratory was carried out. The hawana was carried by Samidha using Palasa (*Butea monosperma*), Pimpal (*Ficus religiosa*), Udumbara (*Ficus racemosa*), Shami (*Prosopis spicigera*), Darbha (*Desmostachya bipinnata*), Rui (*Calotropis gigantean*), Khair, (*Acacia chundra*) Aghada (*Achyranthes aspera*) and Durva (*Cynodon dactylon*). The study indicates the decrease in growth response of aeromicroflora. Percent reductions of microbial count were 43, 30.84 and 56.07% for Bacteria Fungi and Actinomycetes respectively. Study enlight the possible scientific utility of Agnihotra for air disinfection to control respiratory infection.

INTRODUCTION

Airborne transmission is an important route of transmission of infectious diseases. (WHO, 2004) The main source of infection is aeromicroflora associated with laboratories which can cause respiratory problems. Presently, chemical fumigation is used as an adjunct to environmental cleaning of hospital isolation rooms and other critical areas. Chemical fumigation is a procedure that reduces the level of microbial contamination. It can be done by using various chemical fumigants viz. Formaldehyde gas, Hydrogen peroxide, Chlorine dioxide etc. (Fink *et al*., 1988; Klapes and Vesley, 1990; Vesley *et al*., 2001; Knapp and Battisti, 2001). However, Chemical fumigation is effective, it possess lots of hazardous effect and causes serious illness and death. Fumigation with formaldehyde causes sulphydryl poisoning, protein aggregation and cancer (Rengaramanujum *et al*., 2009). The acute renal and liver injury can also develop in cases of severe intoxication by chemical fumigation (Malik *et al*., 1995; Arora *et al*., 1995) Myocardial and skeletal muscle injury can occur due to exposure of phosphine (Khosla *et al*., 1988). The use of chemical fumigants in hospital causes damage to the surfaces and equipments (Mallison, 1980; Garner and Favero,1985). An ideal fumigation agent should provide maximum dispersal within the contained area, should be non- corrosive to surfaces or equipment and quickly degrades leaving no toxic residue (Krause *et al*., 2001; Wilson *et al*., 2005) According to centers for Disease control and prevention (CDC, 2003) guidelines, chemical fogging is not recommended for routine patient care areas. Hence, it is necessary to search for the ecofriendly method for disinfection of air to reduce air borne infection related mortality and mobility. On the other hand, Biofumigation is an effective, safe, inexpensive and ecofriendly technique of air disinfection. Agnihotra is a simple form of homa which involves litting fire in a small rectangular copper pyramid pot (Golechha *et al*., 1987) However; there is scarcity of information about the use of Agnihotra and the aeromicroflora. Taking this into consideration the present study was initiated.

MATERIALS AND METHODS

Collection of plants

Total Nine plants viz; Palasa (*Butea monosperma*), Pimpal (*Ficus religiosa*), Udumbara (*Ficus racemosa*), Shami (*Prosopis spicigera*), Darbha (*Desmostachya bipinnata*), Rui (*Calotropis gigantean*), Khair, (*Acacia chundra*) Aghada (Achyranthes *aspera*) and Durva (*Cynodon dactylon*) (Subrahmanya Prasad and Raveendran, 2010) used in different hawana were collected and authenticated from the "Vedang Pratisthan" located at Akola (MS), India.

Selection of site for Biofumigation

The experimentation on aeromicroflora was carried out in Microbiology Laboratory, having dimensions 22 x 32 (704 sq. ft.). The analyses were carried out at the height of 3.4 feet where the routine microbiological work is carried-out.

In Lab experimental design

The experimental site used for Biofumigation was divided into five different locales and labeled as, L1, L2, L3, L4 and L5, representing the aero-space of the whole laboratory. Biofumigation was carried out by burning the mixture of selected plant with fumigation catalyst viz ghee, cow dung cake (Rengaramanujum *et al*., 2009). The microbial count at each locale before and after fumigation was investigated adopting setting plate device with 15min exposure time. The experiment was carried out in triplicates and the results were

Table 1: Aeromicroflora status before fumigation (location wise mean)

Microflora	Location 1				Location 2				Location 3				Location 4				Location 5			
	R1	R2	R3	Mean	R1	R2	R3	Mean	R1	R2	R3	Mean	R1	R2	R3	Mean	R1	R2	R3	Mean
Bacteria	70	30	50	50	80	100	69	83	166	114	80	120	90	78	60	76	540	258	120	306
Fungi	18	20	22	20	30	27	21	26	40	15	11	22	12	20	40	24	13	33	38	28
Actinomycetes	30	120	78	76	94	70	40	68	95	50	41	62	50	90	58	66	40	45	89	58
Mean Microbial Status	118	170	150	146	208	194	129	177	332	148	132	204	152	188	158	166	591	338	247	392

Microbial count expressed in cfu/15min. at dist. 3.4 feet from base

Table 2: Aeromicroflora status after fumigation with Agnihotra (location wise mean)

Microflora	Location 1				Location 2				Location 3				Location 4				Location 5			
	R1	R2	R3	Mean	R1	R2	R3	Mean	R1	R2	R3	Mean	R1	R2	R3	Mean	R1	R2	R3	Mean
Bacteria	61	19	10	30	50	58	78	62	80	20	104	68	40	120	50	70	180	125	85	130
Fungi	5	6	16	9	30	13	5	16	12	17	22	17	21	10	11	14	34	21	26	27
Actinomycetes	16	8	36	20	44	28	18	30	30	37	17	28	23	58	24	35	67	10	19	32
Mean Microbial Status	82	33	62	59	124	99	101	108	122	74	143	113	84	188	85	119	281	156	130	189

Microbial count expressed in cfu/15min. at dist. 3.4 feet from base

expressed in terms of mean cfu/15min.

RESULTS AND DISCUSSION

In present study, effect of Agnihotra fumes was investigated on the aeromicroflora of the laboratory. Table 1 represents the aeromicroflora status of the laboratory before fumigation at different locations viz. L1, L2, L3, L4 and L5. The Bacterial and Fungal count was found to be maximum (306 and 28 cfu/ 15min.) at location 5. However, the minimum count was obtained at location 1. While Actinomycetes were found to be maximum (76) at same location. It may be due to the diversified metabolic activities of Actinomycetes (Anantnarayan and Panikar, 2008). Hence, maximum mean microbial status at location 5 (392 cfu/15min.) was recorded.

Table 2 represents the aeromicroflora status after Agnihotra fumigation. It was observed that at each locale, there was marked decrease in the mean microbial status comparatively with the count recorded before fumigation. It was 146, 177, 204, 166 and 392cfu/15min, whereas after fumigation it reduces to 59, 108, 113, 119 and 189 cfu/15min respectively. The result indicates the efficacy of Agnihotra fumes for reducing the microbial load there by facilitating the purification of the air. The observation on the present study are in accordance with the experimental findings of certain workers (Gaikwad, 1995).They suggested that apart from air disinfection the Agnihotra fumes also creates pure hygienic, nutritional and healing atmosphere.

Fig. 1 represents the pooled mean of aeromicroflora before and after fumigation. The pooled mean of Bacteria, Fungi and Actinomycetes were found to be 127, 24 and 66 cfu/15, min respectively before fumigation while after fumigation it reduces to 72, 16.6 and 29 cfu/15min respectively. The medicinal fumes emanating from Agnihotra help in eradication of microorganisms which are the root causes of illness and diseases.

Fig. 2 represents percent reduction of total microbial count after fumigation which was 43, 30.84 and 56.07% respectively for Bacteria Fungi and Actinomycetes. Agnihotra fumes were found to be very effective for reducing Actinomycetes followed by Bacteria and Fungi. These results are in accordance with the workers working on same line of research (Mondkar, 1982). They reported that Agnihotra fumes works to reduce aeromicroflora as well as agnihotra ash showed the potentiality to heal the wounds and scabies. Treatment with agnihotra improves germination of rice (Heisnam Jina Devi *et al*., 2004) grape seeds and also quality of grape raisins. (Bhujbal, 1981) Medicinal fumes emanating from the process of agnihotra have been observed by researchers in the field of Microbiology to be clearly bacteriostatic in nature, which eradicate bacteria

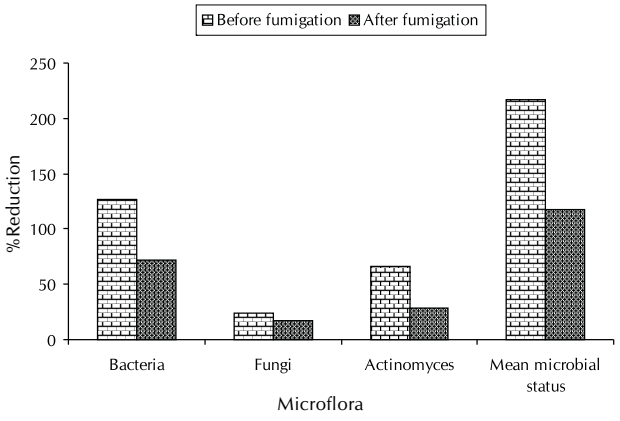

Figure 1: Pooled mean of aeromicroflora before and after fumigation

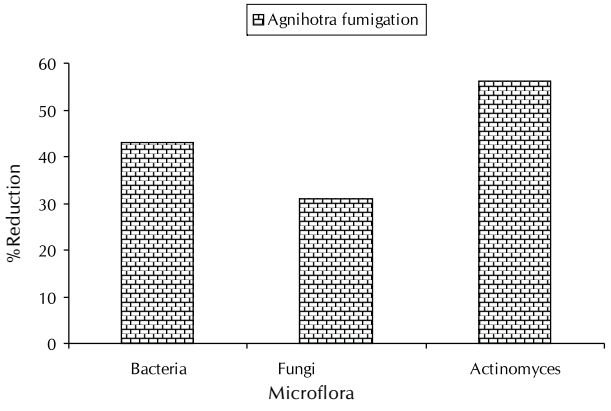

Figure 2: Percent (%) reduction of Areomicroflora after Agnihotra fumigation

and micro-organisms, the root causes of illness and diseases (Yug Nirman Yojna, 1998).

Hence, considering the hazardous effect of chemical fumigation, Agnihotra fumes may be the most lucrative alternative to combat the notorious microorganism present in air. The reduction in the microbial load in the air due to agnihotra fumes might be due to the medicinal volatiles or antimicrobial nanoparticles released. Hence, the Agnihotra fumes can be not only use for the disinfection of air but also it can be environmentally exploited for the physical, mental, intellectual and spiritual development by implicating R and D based on nanotechnology of Agnihotra.

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