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Scientific Study of Somyag Yadnya

Abhang Pranay

Teaching Associate, Institute of Bioinformatics and Biotechnology, SavitribaiPhule Pune University, Pune 411007, Maharashtra, India

Abstract: ***Somyag Yadnya is a ritual of offerings accompanied by chanting of Vedic mantrasderived from the practice in Vedic times. Due to Yadnya fumes and overall process, it affects environmental elements; hence its effects on oxides of sulphur and nitrogen were studied as they are the major air pollutants. Microbial count was also considered during Yadnya. Effects of Somyag Yadnya were studied by collecting surrounding air using handy sampler. SOx and NOx levels before Yadnya, during Yadnya and after Yadnya were calculated and comparedfrom collected air. For microbial count nutrient agar plates were opened and count was taken. As per our results, SOx levels decreases up to 10 times (almost reduces to 90%) that of initial levels due to Somyag Yadnya. NOx levels increases 10 -20 % that of initial levels, but at the end of Yadnya NOx level reduces that to initial. Microbial count significantly reduces up to 98% due to Somyag. Hence by performing Yadnya air pollution can be controlled.***

Keywords: Somyag Yadnya, air pollution, Microbial count, SOx, NOx.

1. Introduction

Somyag is a sacrificial ritual in which Soma juice oblations to the deities due to which five elements in the universe (Earth, Fire, Air, Water and Ether) get energizing, in order to bestow prosperity and restore natural equilibrium (Vaidya V. B., Kale Nanaji, 2014). The name of the whole ceremony comes from *soma*, or *somawali*– fresh green stalks of *Ephedra*(WojciechPuchalski, 2009). The Natural cycle of six seasons is accelerated and regulated by the performance of Somyag.Fire ceremony (Somyag Yadnya) plays major role in refining the human thoughts and life process in accordance with the Nature (S. Sushrutha et al., 2014). During the Somyag, *Somawali*is particularly venerated. The stalks woven in a cloth have been conditioned in a special way by exposing them to energies of the ceremony for some days. Then they were ground in stone mortars with water to pour such a juice into wooden holders of various shapes and to use it for offerings to fire and also to drink during the culminant phase of the ceremony, apparently exhaustive for performers. The main goal of such a large ceremony is said to be clearing and healing of atmosphere, water and soils with use of this special fire. (WojciechPuchalski, 2009)

Major pollutants in air are oxides of sulphur and nitrogen. Apart from these pollutants some pathogenic bacteria are also contribute to air pollutions. As Somyag Yadnya heals atmosphere, one need to study its effects at elemental level. During these study effects of fumes on microbial count, SOx and NOx level were estimated.

AhinDwadashaRatra Somyag was conducted in Urulu (Devachi), Pune, MH. To study the effects of Yadnya on the surrounding air, samples were collected from 6/2/2014 to 4/3/2014 as described in table 1.

Table 1: Date and time when samples were collected and temperatures were recorded

Date and time	*Day*	*Temp. near Yadnya*	*Temp. 50 feet apart from Yadnya*
6/2/2014 Evening	-1	22.5°C	23°C
7/2/2014 Morning	0	13°C	12.5°C
7/2/2014 Evening	0	23°C	23°C
8/2/2014 Morning	1	12°C	12°C
12/2/2014 Evening	5	27°C	26°C
14/2/2014 Morning	7	12°C	12.5°C
16/2/2014 Evening	9	28°C	27°C
18/2/2014 Morning	11	8.5°C	8.5°C
20/2/2014 Evening	13	30°C	29°C
22/2/2014 Morning	15	14°C	13.5°C
24/2/2014 Evening	17	30°C	29°C
26/2/2014 Morning	19	16°C	16°C
28/2/2014 Evening	21	30°C	29°C
2/3/2014 Morning	23	14°C	14°C
3/3/2014 Evening	24	32°C	32°C
4/3/2014 Morning	25	18°C	18.5°C

2. Method

Air samples were collected from specific positions as described in figure 1.

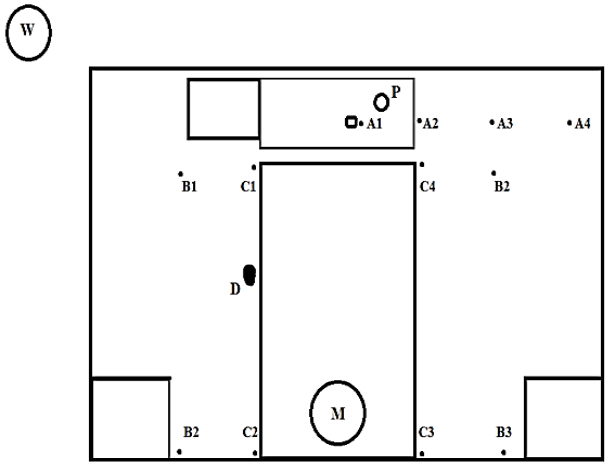


Figure 1: Diagrammatic representation (map) of yadnya and position of sample collection

M- Mahasomyagyadnya. P- Pravargyaaahuti. W- Well. A1, A2, A3, A4- Plates were open at 0 ft, 10 ft, 20 ft, and 30 ft respectively. B1, B2, B3, B4- Place 10 ft apart from the corners where plates were opened. C1, C2, C3, C4- Four corners (vedi) where plates were opened. D- Place where air sample for NO_x and SO_x were collected.

3. Study the effects of fumes on microbial count in the surrounding air -

To study the effect of fumes on microbial count in the surrounding air, method used by Pathade G. and Abhang Pranay (2014) was used. In short, sterilized nutrient agar plates were opened near yadnya and 10 ft, 20 ft, 30 ft apart from the yadnya (as shown in fig.1 positions A1, A2, A3, A4). Experiment was performed in duplicate i.e. two plates were opened at the same position. Plates were also opened at the four corners (vedi) of Somyag (as shown in fig.1 positions C1, C2, C3, C4), and 10 ft apart from the corners (as shown in fig.1 positions B1, B2, B3, B4).Plates were incubated at room temperature for 24 hours and colony count was taken and Graphs were plotted for,

A. Average microbial count at 4 corners and 10 ft apart from corners taken at morning and evening for alternative 25 days.
B. Microbial count at 4 corners and 10 ft apart from corners taken at morning and evening for alternative 25 days.

I. Estimation of SOx

SO_x was estimated by improved West and Gaeke method (1956), in short, SO_2 from the surrounding air stream was absorbed in a sodium tetra-chloromercurate solutionwith the help of Handy sampler. (Spectralab, HDS -8)on alternative 25 days at the position D (as mentioned in fig.1), it forms a stable dichlorosulphomercurate $(HgCl_2SO_3)^{2-}$ complex, which then behaves effectively as fixed SO_3^{-2} in solution. The amount of SO_2 was then estimated by the color produced when p-rosailine-hydrochloride and formaldehyde was added in solution, which can be measured on spectrophotometer at 560 nm. Calibration curve of standard sodium meta-bi sulphate was used for SOx estimation by using following formula-

$$\text{SO}_x \text{ in ppm (by volume)} = \frac{\mu\text{g of SO}_2\text{/mL (from calibration curve)}}{\text{Volume of air sampled /L}}$$

$$\mu\text{g /m}^3 \text{ of SO}_x = \frac{\text{ppm by volume} \times 64 \times 10^6}{24470}$$

II. Estimation of NOx –

NO_x was estimated by modified Jacobs - Hochheiser method (1972), in short, NO2 in air was collected by scrubbing a known volume of air through an alkaline solution of arsenitewith the help of Handy sampler (Spectralab, HDS - 8),on alternative 25 days at the position D (as mentioned in fig.1). The nitrite ions thus formed was reacted with sulfanilamide and N-(1-naphthyl) ethylenediamine (NEDA) in phosphoric acid to form the colored azo dye, which can be measured on spectrophotometer at 540 nm. The method was standardized statistically by using $NaNO_2$ standards. Standardization is based upon the empirical observation that 0.74 mole of $NaNO_2$ produces same color as 1 mole of NO_2. SO_2 can be removed using H_2O_2.

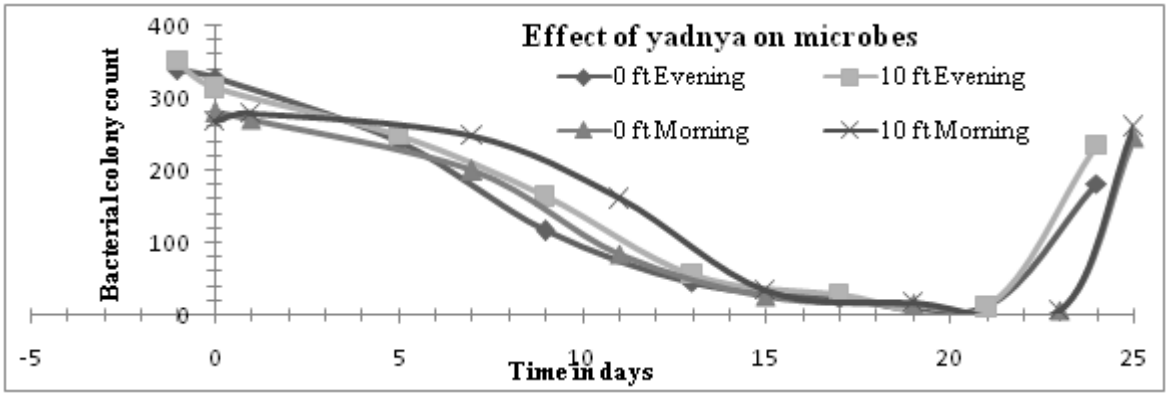
$$\mu\text{g NOx/m}^3 = \frac{\mu\text{g of NO}_2\text{/mL (from calibration curve)} \times \text{volume of reagent}}{0.85 \times \text{volume of air sampled in m}^3}$$

$$\text{NOx (ppm)} = \mu\text{g of NOx/m}^3 \times 5.32 \times 10^{-4}$$

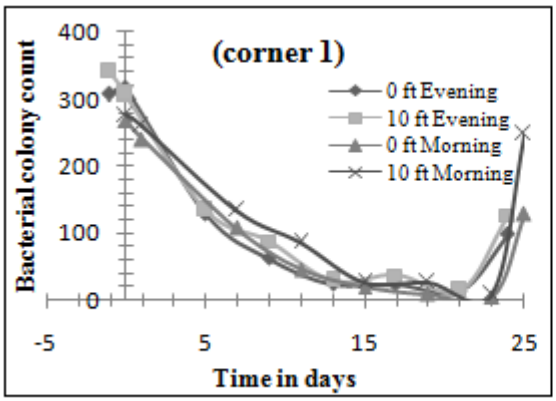
4. Results

4.1 Effects of fumes on microbial count in the surrounding air

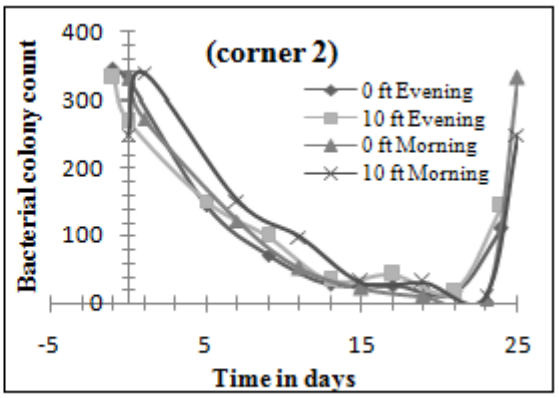
As per the results, microbial count in the air decreases up to 95% due to fumes of the yadnya. Average colony count before yadnya (day -1 and 0) was 346 colonies which get reduced to 12 colonies at the last day of yadnya (day 23).Microbial count is least near the yadnya (0 ft), and increases as distance increases (As in graph 1). As compare to the average of microbial count, taken before yadnya (i.e. 305 colonies on day -1and 0) was reduces up to 81%, 79%, 77%, 72% at 0 ft, 10 ft, 20 ft, 30 ft respectively (an average of count at specific positions, i.e. 56 colonies at 0 ft, 62 colonies at 10 ft, 69 colonies at 20 ftand 85 colonies at 30 ft), during yadnya.



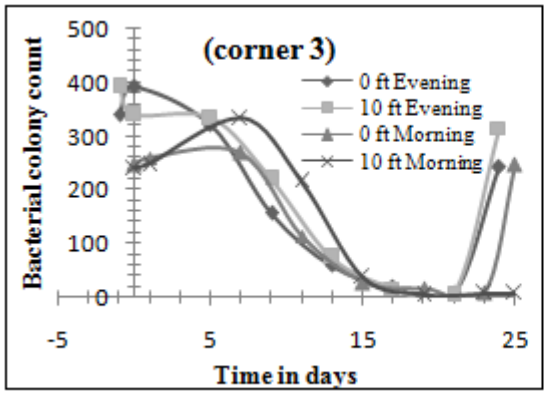
Graph 1: Effect of fumes on microbial count taken at the corners (average count)



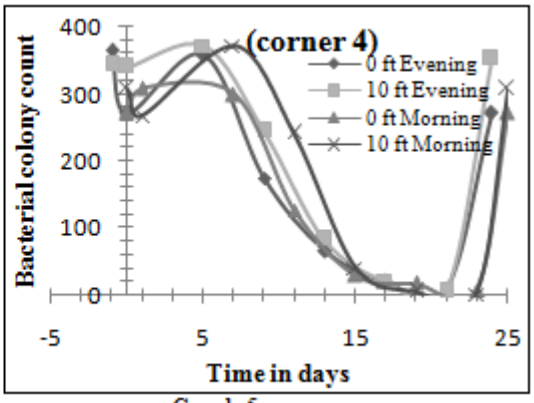
Graph 2



Graph 3



Graph 4

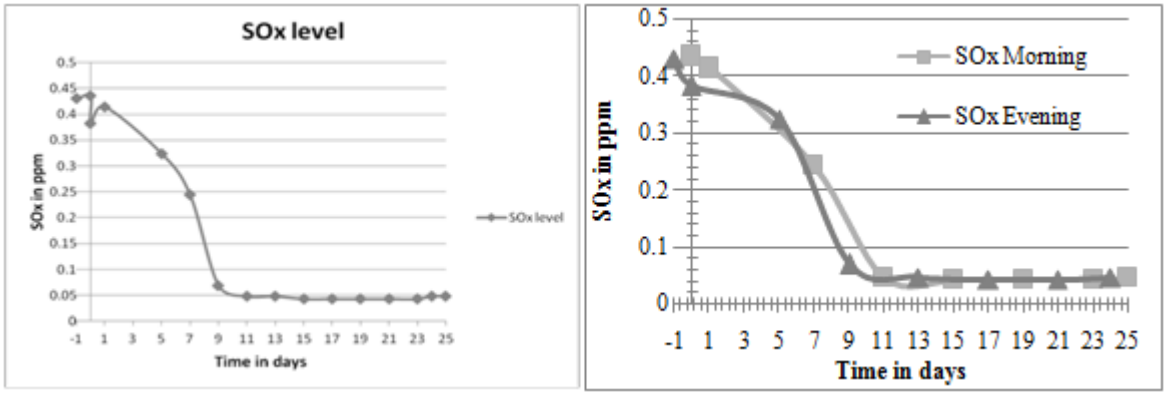


Graph 5

Graphs 2,3,4,5. - Effect of fumes on microbial count at corner 1,2,3,4 respectively taken in the morning and evening. Microbial count is less in all four corners as compare to 10 ft apart from the respective corners. Average count at 10 ft apart from corner (113 colonies) was 18% more as compare to an average count at respective four corners (94 colonies). (Red and purple lines are above the blue and green lines in the graph 2, 3, 4 and 5). Microbial count was least during the period day 15 to day 23, but it increases after the yadnya (i.e. day 24 and 25). It was during those days when Somyag yadnya was performed.Microbial load in the air can be reduced by performing yadnya daily.

4.2 Estimation of SOx

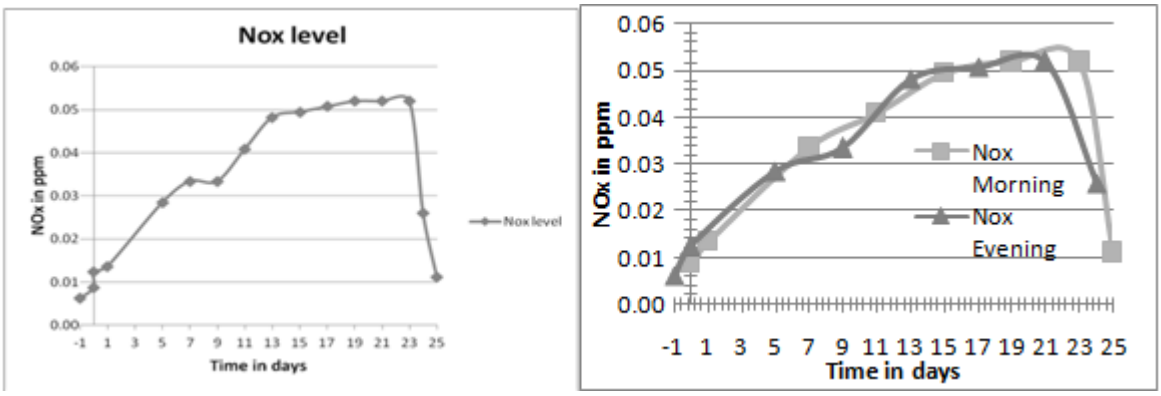
SO_x level decreases during and after yadnya up to 10 times that of initial (Reduces from 0.43 ppm to 0.048 ppm). SO_x level remains decreased after the yadnya (at least up to 2 days) was finished (as in Graph 6). SO_xpollution in the air can be reduce up to 90% by performing yadnya.



Graph 6: SOx levels in morning and evening during 25 days

4.3 Estimation of NOx

NOx level increases during Yadnya up to 0.05 ppm, but also decrease to normal level (0.01 ppm) after Yadnya (on day 24 and 25).NOx level increases up to 20% as compare to initial (day -1 and 0) NOxlevels (Graph 7).



Graph 7: NOx levels in morning and evening during 25 days

Standard NO_x (mostly NO_2) level provided by 'National Ambient Air Quality Standards' (NAAQS) as well as 'Maharashtra Pollution Control Board' is 0.053 ppm (annual average per hour). Maximum value recorded was 0.052 ppm (during day 19 to 23) which is less as compare to standard levels.

5. Conclusion

Due to Somyag yadnya microbial load in the air can be reduced up to 95%. Many of the bacteria present in the surrounding environment may be killed or inactivated due to Somyag Yadnya. SOx levels decreases up to 90% which is long term effect due to Yadnya. Although NOx levels increases due to Somyag, it was reduced to its initial levels. As per results NOx levels does not exceeds standard or threshold levels. Results show that Somyag Yadnya can control air pollution due to microbes and oxides of sulphur and nitrogen.

6. Acknowledgement

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Author Profile

Pranay Abhangreceived the B.Sc. and M.Sc. degrees in Biotechnology of Pune University from Fergusson College, Pune in 2012 and 2014, respectively. He joined Institute of Bioinformatics and Biotechnology in SavitribaiPhule Pune University from 2014 as a Teaching Associate.