AST-5

SCIENTIFIC EVALUATION OF YADNYA
A Pilot Project

Pandit Pimpalkar & Dr. V. S. Govardhan
(Ventured by Swadeshi Vidnyan Sanshodhan Sanstha Nagpur as on 7, 8 & 9th April 1990 openly at the Court yard of Dr. V. S. Govardhan's Bunglow in Civil Lines area of Nagpur.)

Swadeshi Vidnyan Sanshodhan Sanshta since its inception has been working with conviction that the Sanatan Hindu Dharma, which is Vaishwik in nature, in its entirety is based on Science and the Vedic Rituals being its part and parcel from time im-memorial were clear unfoldment of scientific and technological knowledge earned out of incessant penance for research in Nature.

Our another Founder-Trustee **Shri Krishna Vasudao Bapat,** who is **Ahitagni Dixit i.e. Agnihotri** and as such well versed in Yadnya-Karma took initiative in spelling out Rudra-swahakar (Yadnya) to start with as a pilot project. Our Trustee and then President Dr. Vinaykumar Govardhan, F.R.C.S., a renowned Surgeon as well as a eminent Vedic student of Nagpur, gladly accepted Yajaman-Pad of this Yadnya successfully carried out in his residential court-yard at Civil Lines area. Dr. Vinayak P. Thergaonkar our then Vice President, Dr. S.R. Joshi, one of our Secretaries and Dr. Mrs. Rekha Anil Thakre, our Founder Committee Member, all the three Scientists then having job in National Environmental Engineering Research Institute (Under C.S.I.R.) stood firmly for the cause with sizable team of Scientists at their comand. Shri Bapat Shastri being 'Adhvaryu' organised a team of eleven Rudra-Pathi Purohits and Shri Baburao Dhamankar Shastri, Veda Shastra Vibhushan of Nagpur, was proposed as 'Brahma' i.e. Guide & Philosopher of this team.

PLANNING :

We went into the details of how the Yadnya was to be performed. Basically two teams were formed, one included the Yadniks and Yajamana and the other the Scientists from various disciplines. Every care was taken to perform this Rudra Swahakar as mentioned in the original text. With the help of the available literature and the knowledge of the Brhama & Adhvaryu, a detailed plan was chalked out. Care was taken that details were followed without compromise.

The preparations also included Prayaschitta Vidhi by Adhvaryu and Yajamana after undergoing a very strict life style which included recitations of a Mantra for over 15 days period earlier to Yadnya.

A detailed list was made of the materials to be used in the Yadnya and the same was procured in the exact quantities. A separate group of people was assigned the task to find botanical and other medicinal properties of the substance to be offered during the Yadnya. The construction of the Yadnya

shala was arranged as was prescribed. This was possible because some ancient references were found by the member of our team and these were incorporated into. It was indeed very amazing to see the details, which were worked out in those days. The credit goes to **Shri Nandu Godse**, a Renowned Architect of Nagpur, who is equally well versed in the topic. An auspicious day was decided according to the Indian calendar (Panchang).

SOUND:

The chanting of the Mantras was recorded on a sensitive recording system all through 3 days. These audio tapes were analysed in the sound laboratory to assess the sound frequency by adopting a sampling method.

CHANGES IN THE AMBIENT AIR QUALITY DURING THE PERFORMANCE OF YADNYA

The main & very objective purpose of this project was qualitative & quantitative measurement of environment parameters to assess the impact of RSY (Rudra Swahakar Yadnya) on environment.

MATERIALS & METHODS :

The offerings inYadnya (materials put in Yandya Kund to burn as Hawaniya Dravya) were Ghee, Rice, Black Seasamum (til), barley (Jav) and the moist twigs of the plants i.e. Samidhas of Palas, (Buteamonosperma), Rui (Calotiopis), Umbar, Shami and Darbha as well as Harali (Green Grasses). A small sample from each of these materials were kept aside for testing. Five grams each of the sample was burnt at 450-500°C in muffle furnace to get ash. This ash was later on dissolved in conc. HNO_3 and soluble fraction was obtained by filtering through white non filter paper no. 42. Metallic elements dissolved in the filtrate were then analysed on **Atomic Absorption Spectrophotometer.**

The gaseous products generated after burning these materials in Yadnya Kund were tested. Air sampling points at strategic places were selected and the same are shown in the figure. The main constituent of these materials were carbon, nitrogen and sulphur. Thus the measurement of hydrocarbons (HC), nitrogen dioxides (NO_2) and sulphur dioxide (SO_2) since these are the product results after burning. SO_2 & NO_2 were aspirated through glass impinger tubes containing absorbing media and collected for further analysis in the laboratory. For collection of these gases air was sucked at a rate of 1 l/min by a suction pump. SO_2 was analysed by West & Gacke method while NO_2 by Jacobs & Hocelliesser method.

While Yadnya was performed, alongwith air quality monitoring various meteorological components were also measured. These meterological parameters were temperature (°C), relative humidity (%RH) and wind speed (m/s). Temperature measurement were taken inside and outside of Yandya Kund and Vedi in the vicinity of Brahmins performing Pooja and outside Yadnya Shala, where observers were sittings. See Table No. 1 & 2 annexed.

Carbon monoxide gas was constantly measured by **automatic infrared Gas Analyzer.** The particulates of various sizes were collected and analysed for 0.3, 0.5, 1.0, 5.0 and 10.0 micron size which constitute the size fraction capable of being inhaled by human beings. Hydrocarbon contents were determined by automatic hydrocarbon monitoring system. See Table 3 & 4.

RESULTS & DISCUSSION :

Ambient meteorological observations reveal that on all the three days temperature during Rudra Swahakar time, varied from 25° to 35°C the maximum temperature was recorded on second day at 11.00 am. Every day in the morning hours at the time of start temperature was 25-27°C, while at the end of the rituals the temperature ranged from 32-35°C. Relative humidity on the other hand was decreasing as the sun was rising. Wind speed ranged from 8-20 meter/second i.e. rather calm conditions prevailed all the three days (tabled). Temperature inside Yadnya Kund were 500-600°C while surrounding Vedi it was 40-42°C see Table-2.

Carbon monoxide concentration levels inside Yandya Mandap show increasing trend. As the ritual starts (Table 3) CO Concentration build up also increases. This may be due to the rapid additions of Havana materials which are basically of organic origin. This rapidity of additions results in insufficient supply of oxygen giving rise to formation of CO. However, the CO concentrations measured were well below permissible levels from human heath point of view except causing inconvenience for short duration to those sitting in the immediate vicinity of the Vedi.

Particle count in various size fractions revealed that the maximum count was recorded in the particles of <0.5 micron size fractions. Particles of >10-micron size fraction represented count-ranging from 7-18 count no/s (Table 4). These small size particles are capable of remaining suspended in the air for quite a long time due to their collidal nature. It is quite possible that they collide with each other forming particles of larger size and precipitate under gravitational force. During this process other micron size particles like bacteria also combine with these fine particles of Yandya Origin and remove bacterial from the atmosphere. This hypothesis is also substantiated by the bacterial count strudies which indicate that bacterial count has decreased in he surrounding air.

Concentration of SO_2, NO_2 and hydrocarbon levels monitored during Yandya performance have been denoted in Table 5. The SO_2 levels inside Yadnya Mandap were at base line. NO_2 concentrations of course were higher than the permissible levels prescribed by Central Pollution Control Board New Delhi for ambient air quality. Hydrocarbon percentage also increased during Yandya rituals. However, these are total hydrocarbons and no analysis for cyclic/non cyclic and aliphatic/aromatic fractions was made. Thus it is not pertinent

to make any comment as regards to the toxicity of hydrocarbon increase in the atmosphere.

-By Dr. Mrs. Rekha Thakre

Senior Scientist, (Dy. Director at Present), NEERI, Nagpur

BACTERIOLGOCIAL ASPECTS

AIM : To study the impact of Yadnya on bacterial quality of air around it.

METHODOLOGY :

Bacterial populations measured using Nutrient agar which has following composition

Peptone	5gm.
Beaf extract	3gm.
Agar	15gm.
D. Water	1 Lit.
PH	7.2

AIR SAMPLING : DIRECT EXPOSURE METHOD : Patridishes containing nutrient agar were exposed indelicate near the site of Yadnya for a period of 5 minutes at every two hours period.

AIR SAMPLING: IMPRINGER METHOD : In this method air was continuously passed through sterile phosphate buffer solution kept in impringer for a period of about 5 hrs. An aliqnat of 0.1ml. was streaked over the solid agar plate in duplicate. These plates were kept in incubator.

INCUBATION PERIOD : All the plates were incubated at 37°C for a period of three days. Bacterial colonies developed were counted.

CONTROL: As a control, nutrient agar plates were exposed to air (5mls) nearly 200ft. away from the site of Yadnya. Colonies developed were counted.

RESULTS: It could be seen from the Table 6, 6-a, & 6-B that count at Yadnya site was less than the count obtained form T control i. e. away form Yadnya site. In general to control count is less as compared to residential count at Nagpur &at Madras as reported inTable 5. The bacterial count of Tirth however, was very high and it was more than 106/ml. See Table-8.

DISCUSSION:

In general it is observed that bacterial count is less not only at Yadnya site but also at control point. The control point was near the cow shelter and nearby there was a smell of cowdung heep. The less count may be due to spreading cowdung over the soil. The volatile substances present I cow dung might be responsible for less count in control.

The count observed at Yadnya site is also less and it might be due to following reasons.

- Temp. was abut 40°C
- Due to Aahuti, chemical substances formed might be determinal to bacteria.
- Presence of NO_2 and CO might be inhibitory to bacterial population.
- Since lot of oily materials are added in Yadnya "Colloidal matter" formed during their oxidation might have absorbed bacterial cells.
- Lack of humidity and upward trend of smoke which must have carried away the bacteria from Yadnya site might be the responsible factors for less bacterial count.

The higher bacterial count in Tirth might be due to addition of unsterile matters like Honey, Milk, Water, Ghee, and Sugar which are always associated with bacteria.

RECOMMENDATION :

It was the first attempt to study the effect of Yadnya on environment both chemical and biological environment. Experiments were carried out only to assess the bacterial population at Yadnya site. However for confirmation of the results obtained and for better understanding following recommendaitons are made.

Instead of only bacterial population different groups of organisms like bacteria, Aclinomycate, Yeast and Fungi should be measured.

Type of bacterial aclinomycate, fungal species also should be studied and identified.

Pathogenic bacterium as a representative of disease producing organism should be enumerated from air and water used.

Proper control instead of cow shed should be selected.

For every sample taken at Yandya site at the same time control sample should also be taken.

Effect of cowdung, urine of cow and ash obtained from Yadnya Kund after Yadnya on bacterial population can be studied.

Effect of Tirth on bacterial population also should be studied.

Samidhas are kept in water for 48 hrs. before use. Their extractives available in water can be studied for inhibitory effect on bacteria.

-By Dr. S.R.Joshi (Retd. Dy. Director, NEERI)
& Prof. Dr. N. Parhad, (Both Microbiologists)

PHYSICO – CHEMICAL RESULTS OF TIRTHA & VIBHUTI (BHASMA)

The Table No. 10 deals with the analysis of samples i.e. water samples (Tirth) collected and mixed together from various earthen as well as copper pots (Kalash) and 5% extract of the ash (Bhasma). For comparision, analysis of fly ash is also quoted. Table No. 9 gives the details of heavy metals present in the samidhas from various trees which enlighten the presence of metals in individual Samidha and residue left in the ash as its oxide. Cadmium being volatile at temp. 500-600°C was expected to be absent in ash and as such it is negligible in Samidha whereever present. Table No.11 gives us the background care of elements which continue the ash and hence comparison between ash and fly ash will help us in predicting beneficial effects of ash (Bhasma).

As evident from Table No. 10 conductivity of 5% water extract of ash is ten times more than even 10% water extract of fly ash. Ash obtained from cowdung cakes is also required to be analysed for comparison so that it will reflect upon whether the cause of change in conductivity is either due to cowdung alone or due to various samidhas. It is predominantly observed that iron is present in all the samidhas and naturally in ash (Bhasma) i.e. why iron content of 5% water extract is more than fly ash extract. Iron, Mn. & Zn. is invariably present in all samples and ash, whereas Cu is in small amount. The toxic metals like Cr. & Pb., are present in traces in samidhas.

While summarizing the data I will like to mention here that presence of iron in ash & copper in water sample (Tirth) will have beneficial effects as regards water/ash analysis is concerned. While the effect of gaseous and SPM emission on environment, hey have already been discussed by Dr. Mrs. Thakre.

My personal opinion is that stimulant effect of small amount of toxicant or pollutant gases might be there in clean environment in early days, but how far it will be true in these days when we are immune to high background levels of these pollutants in ambient air. Other volatable matter besides Hydrocarbons are required to be detected in air samples along with usual pollutant gases like SO_2, NOx, CO_2 & CO so that some concrete opinions can be made. Thermal & particulate matter was already discussed.

Moreover effect of sound waves gets synchronized with this air emissions and over all effect either in reducing the bacterial count or cleaning of atmosphere etc. is a combined effect of these two factors. Only burning of these materials will have no positive effect nor only chanting of mantras will be useful and that is why it is a combination of both.

-By C. A. MOGHE

Senior Scientist, NEERI, Nagpur.

GENERAL OBSERVATIONS AND CONCLUSIONS

The findings of the ambient air analysis – It is noted that the bacterial count decreased as the Yadnya proceeded. What is of particular interest is that on the progressive decrease in the total bacterial counts as the Yadnya proceeded. Of particular importance is the low count of bacteria on the beginning of second and third day's functions.

Another thing of importance was the preponderance of particles of very small size in the smoke as well as in the air.

The concentration of SO_2, NO_2 and hydrocarbon is given in the table.

As regards the temperature reading, it is included in the Annexed Tables. What we would like to emphasize is that the temperature as given in the Annexure is only a rough guide because it varied quite significantly during the procedure of Havana.

As regards the ability of the smoke, from the Hom-Kund to remove noxous products, we have found no direct evidence and we feel, it needs further scrutiny. One thing I feel reasonably certain about is that the higher levels of NO and Hydro-Carbon need not necessarily be taken on its face value, for its concentration as well as the duration for which one is exposed to these will determine the net effect.

As regards the analysis of the Tirtha and Vibhuti, the results are indeed of some interest. This obviously indicated the presence of these chemicals in the offerings at the Yadnya.

As regards the Tirth, the source of these chemicals is obviouly the vegetable and other organic matter. Of interest is the chemical composition of both the Tirth and Bhusma which on its fce value should have a beneficial effect on the living beings. The results of Mantras are specially analysed by very eminent Scientist & Accoustic Expert Dr. S. Rajagopalan, then Reader in Physics, P.G.T.D. Nagpur University and explained by way of Graph. They indicate peaking at a frequency of 3KHz. 1.8KHz and 4.1 KHz in particular. Other sub-harmonic frequencies also show peak at different amplitude levels. It is of interest to note that in the frequency range of 300 Hz to 4100Hz chorous effect is prominent. Part of this frequency range also coincides with the region of high sensitivity of human ears and also with the best of receptivity of man.

Additional point of interest is the continuous presence of frequency compartment of 700Hz to 3KHz. The main reason for prolonged presence of the signal is the chorus pattern intonation. This will mean a continued registration of this sound by brain.

COMMENTS ABOUT EFFECTIVENESS :

As regards the temperature variations and the relative humidity near the Vedi. It shows wide variations as also the temperature surrounding the Vedi. A common denominator being the temperature progressively raised as the function proceeded. The temperatures inside the Yadnya Kund also variate. This obviously was depended basically on the material offered, and as a personal observation, it had a wide range of fluctuation. This has to be accepted. This obviously must affect two things in particulars:

1] The size of the particulate matter

2] Dispersability of the smoke.

I feel, this must have a direct co-relationship with the area that can be covered and environmental pollution reduced. Our findings in a way substantiate the old belief in this regard. In this respect, the modern building construction with tall buildings and relative lack of greenary would naturally prevent the net efficacy of this method for pollution control. Even the old belief can be substantiated on the basis of the cumulative effect.

As regards the carbon-dioxide, the level inside the Yandya Shala shows a rising trend. What was of a particular importance was that the CO concentration remained well below the permissible level. Whether this will have any positive effect on the human physiology or not will need further experimentation.

Particle count in various size fractions revealed highest concentration of 0.5 micron. These small particles are capable of remaining suspended in air for much longer period

before colliding with each other and precipitate under gravitationaly force. This is obviously responsible for removing noxious matter including bacteria from atmosphere.

Encouraging results of the bacteriological aspect naturally demand further experiments. Our findings as included in the data, justify the statement that the quality of atmosphere as regards the bacteria is improved. This will naturally need further experiments to determine an overall special spectrum and their pathogenesity. Bacteriology of Tirth is one which justifies our above statement, This is so particular because the water and other materials were collected from conditions which must encourage contamination rather than decrease the same. And yet the same is offered as 'Tirth'. When we see analysis of this Tirth. I wonder whether the position thereof renders these bacteria harmless or may be they act in different manner which may strengthen the advance system.

Analysis of the Bhusma and Tirth although very impressive in what way does it affect the general life process has remaind very much of conjecture. In general, Bhusma seems to have composition which is conducive to a life process. Whether in fact it actually does so in the quantity that is used by the general public will always remain unexplained. However, for those doing penance at higher altitude, who uses this liberally, should have many more effects than pure insulation. Of note is higher conductivity and the preponderance of beneficial elements. Our attempt to identifiy some un-idnetified matter was unsuccessful. Quantitatively to prove beneficial effect of the sound vibration was most difficult. But knowing the fact that it is possible with certain sound frequencies may have a target effect on certain part of the nerve system and body in general. It was only to be presumed that it may have a beneficial effect. The problem of proof in this regard will also be difficult because it will certainly depend on the psychological make up of the belief of the subjects. I still feel that this area is very much worthy exploring further.

All in all, although our parameters of assessment were limited and acted as a mere screening device, two simple conclusions can be drawn. In general, it can be said that it has a positive net beneficial effect and hence those performing or taking part in this, will benefit from it. And the second that this ritual has a scientific basis for its claims.

Sd/- Dr. V. S. Govardnan *F.R.C.S.,*
Then President & Trustee.

This Pilot Project on Yadnya especially the scientific experimentation described hereinbefore, has certainly created a record in the research field and will prove as a milestone for future.

-Pandit Pimpalkar
Founder-Trustee,
Swadeshi Vidnyan Sanshodhan Sanshta, Nagpur.

ANNEXURES

TABLE NO. 1

AMBIENT METEOROLOGICAL CONDITIONS DURING AIR QUALITY-MONITORING

Date & Time	Temp. °C	Rel. Humidity (%)	Wind Speed (m/s)
07-04-90			
7.00am	26.0	68	(8-20m/s) 15m/s
9.15	29.0	58	
10.00	30.5	50	
11.00	33.0	52	
08-04-90			
8.00am.	25.0	70	15m/s
9.00am.	30.0	60	
10.00am.	31.0	45	
11.00am.	35.0	18	
09-04-90			
7.00am.	27.0	40	10m/s
8.00am.	28.0	30	
9.00am.	30.0	23	
10.00am.	32.0		

TABLE No. 2

TEMPERATURE INSIDE YADNYA KUND & SURROUNDING THE VEDI

	Site	Temperature °C
1.	Inside Yadnya Kund [Ignition temp.]	500-600°C
2.	Outside	40-42°C