



RESEARCH ARTICLE

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Agnihotra: The Energy System Affecting Plant Growth: Possible Role Of Phytohormones-Studies On Some Common Household Plants

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ABSTRACT

The present study done as a sequel to the previous one that assessed the effect of Agnihotra vapour on some common household plants, has again confirmed the results of previous research. Some new plants were also included in the experiments for reaffirmation of the assessment. The results have shown conformity to the previous study. In the new study, only the **polished grain vapour** was used. It was observed that most plants responded by tremendous leaf proliferation where the new branches were produced in axils of each and every old leaf. Lateral bud initiation seems to be main effect of the vapour. A rose plant kept in the atmosphere of Agnihotra showed that a new branch had grown from the side at the bottom of the plant, and this new branch produced became equal in height to the older branches in 3 days time (cell elongation) and went on to produce buds. Some plants responded by showing increased senescence giving way to the reproductive structures. The experiment designed with bottled money plants kept in the Agnihotra atmosphere responded by producing new leaves and roots while control plants kept in the same light and air conditions had shown no new growth. The paper offers a scientific background for Agnihotra's effect on plants through involvement of phytohormones.

Keywords: Agnihotra, Cell division, Cell elongation, Bud production, Lateral bud initiation, Phytohormone, Brassinolides

Introduction

The present study carried out as a sequel to previous study [1] has reaffirmed the positive role of Agnihotra vapor (fumes) on household plants. In my earlier study the effect of *polished rice grain* (Rice grains which are milled to remove the bran layer, these are white in color) vapor vs *unpolished rice grains* (hulled or un-milled rice with intact kernels; brown rice) vapor was studied. It was shown that the effects like increase in cell division and *senescence* (growing old; dying. It is generally associated with yellowing of leaves) were more pronounced in case of polished rice grains. In the present study only the polished rice grains i.e., the white rice grains, were made use of for the ritual of Agnihotra both at sunrise and sunset.

1. What is Agnihotra?

Agnihotra is a Vedic Yaga procedure followed in the ancient

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times in India, which is mentioned in Atharveda and described in detail in Yajurveda Samhita. The Agnihotra ritual was revived in the Ashram of Shivratri in 1969 [2]. This is a process, which is known to purify the surrounding atmosphere through specially prepared fire.

"According to Vedic Science, at sunrise the many fires, electricities, ethers and more subtle energies emanating from the sun extend all the way to the Earth and produce a flood effect at those coordinates where the sun is said to rise. Then yajnyas (ritual, i.e. strictly determined fires, offerings and mantras), as this system of knowledge explains, purify the atmosphere and allow better absorption and transformation of incoming solar/cosmic radiation and its interaction with energies of the earth, soil, water and living organisms" [3].

Since plants extract 70% of nutrition from the atmosphere; hence, the emphasis on purification of the atmosphere. Agnihotra is a simple process of purification of the atmosphere by specially prepared fire according to Vedic methodology. It has been used successfully in conjunction with Biodynamic methods to produce maximum yields and top-quality produce [4].



The most significant aspect of Agnihotra is that it combines the energies of five elements: air, water, earth, sun and space to produce subtle changes in the living organisms.

2. What are the effects of Agnihotra?

Jagdish Chandra Bose had proved by his experimental studies that plants grew better in response to music. Similarly, as most reports say, “Agnihotra makes the plants happy!”. It kind of tries to restore the equilibrium in nature [5].

Some scientific reports [6, 7] have documented the use of Agnihotra for psychological healing. Agnihotra farming has been adopted in countries like, Poland, Germany etc. to increase the yield and improve the quality of the soil. Agnihotra farming is also promoted by Institute for Vedic Studies in India [8].

Positive role of Agnihotra ash in organic farming has also been shown through certain scientific studies [9]. Increase in solubility of Phosphorus and its increased availability to the plants is the explanation offered for the observed increase in yield.

The “Agnihotra vapor” together with “ash” creates a holistic system for plant growth. Apart from India, this potential of Agnihotra is being utilized in countries like Germany and Poland for organic farming where Agnihotra is not only increasing yield, but also saving the environment from the use of pesticide.

According to many published sources Agnihotra fumes help to reduce the number of pathogenic bacteria, Agnihotra ash has also been shown to have bacteriostatic effect on pathogenic bacteria [10]. A recent study has also confirmed the role of Agnihotra fumes in the reduction of aeromicroflora [11].

I had also conducted some microbiological experiments along with my colleague. Inhibition of growth was observed in some plates kept in the surrounding area of Agnihotra fumes, however, in plates kept very near to agnihotra vessel, growth of bacteria was observed. Later I realized that it may be because of the agnihotra vapor rises away from the source. Because of lack of clarity of results, I did not give the results of study for publishing.

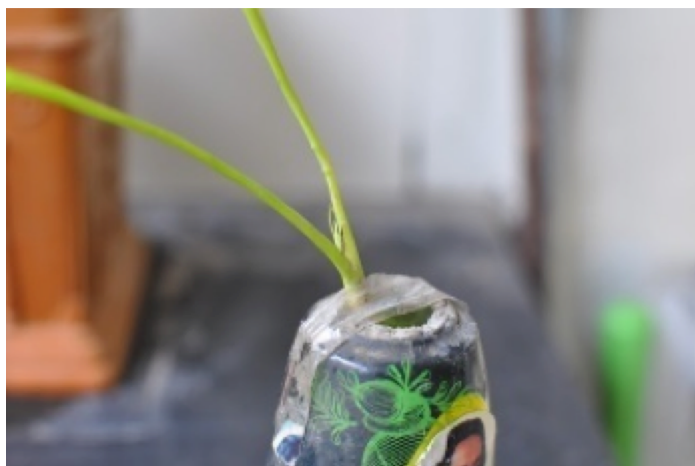


Figure 1: Production of twin scale like leaves in exposure to Agnihotra fumes.



Figure 3: Proliferation of leaves, also notice the characteristic shape in opposite leaves.



Figure 2: Production of new leaf was observed in Agnihotra atmosphere. The plant was shifted to the terrace on 21st January 2012 and the above picture was taken on 8th Feb 2012. See the bulge formation at the base of one leaf. The plant had three leaves one was fallen after senescence. Here very little amount of ash was also used.



Figure 4: Lateral bud initiation.

As Agnihotra fumes rise and travel a long distance, the positive effects in a field are observed till a long radius. However, for these effects, the most significant aspect of Agnihotra is that it should be performed daily at exact time of sunset and sunrise along with offerings of unbroken rice into the fire lit in the copper Agnihotra vessel by chanting of the proper Mantras.

3. Chance Observations of the Author

My most startling observation was the appearance of two scales or appendages into the 2 bamboo leaves lying as such in a bottle for around 4 years (Figure 1). This bottle was kept over a switch board (at a raised height) near the place of performing Agnihotra.

The curiosity of formation of new leaves in Bamboo plant had led me into observing the effect of Agnihotra on a money plant lying dormant on a shelf as such for more than two years. And to my surprise it had happened in Agnihotra atmosphere (Figure 2). Increased leaf proliferation (Figure 3) and lateral bud initiation (Figure 4) was also observed in the earlier study.

4. Possible Mechanism of Action

“Despite a growing number of claims, originated from various regions of the world, indicating that with performing of Agnihotra alone or with other Homa Therapy rituals one may improve quantity and quality of agricultural crops (even with no need of fertilizer use), their resistance to unfavourable environmental factors and pests, as well as animal and human health, there still are almost no scientific studies explaining at least some mechanisms of Agnihotra effects on living organisms. Often there even seems to be no doubt that these extraordinary, amazing effects should be contributed to the performance of Vedic procedures, but they probably never were studied with use of experimental designs demanded to be accepted as valuable scientific results. According to Vedic knowledge, Agnihotra effects are mediated by changes in atmosphere within some area around a site of its performance, and by special properties of Agnihotra ash” [12].

The homa-farming methods have been used for crops like grapes and rice and other commercial crops. Efforts put by authors like [13] and [14] are a good in this regard. However, the scientific rationale behind this heavy growth stimulation still remains to be answered.

It seems that lighting of the fire helps to combine the energies of setting sun with the rising moon and the energy of rising sun with that of setting moon. As said earlier; multiple types of subtle energies are supposed to be generated which are beneficial for the whole environment and the living organisms. Through efforts put by me in last three years of research, I am trying to offer a convincing scientific explanation behind the action of Agnihotra fumes on plants.

Materials and Methods

A. Agnihotra as a Vedic Procedure

As a Vedic procedure, Agnihotra fire requires three inputs:

1. Specific organic substances (rice grains) burned in a copper pyramid
2. AgnihotraYaga being performed at exact timings of Sunrise and Sunset
3. And the Vibrational inputs in the form of two short Sanskrit mantras

The fire is lit in a pyramid shaped copper vessel of specific dimensions (Base: 5.25cm*5.25cm; Area at the open end: 14.5cm*14.5 cm and height: 6.5 cm). Cow dung cakes are arranged in the vessel along the 4 sides in a way so as to allow for free passage of air. Cow ghee (melted butter) is applied at the lower surfaces of the cow dung cakes, whereas it is applied on the upper side of cow dung piece to be placed in the centre. A triangular cow dung cake piece on which ghee is applied on both sides is put above the central piece. Fire is lit with the help of camphor. A smoke-less fire should be ready before the *Ahuti* (offering) is made at the exact sunrise and sunset timings. At exact sunrise and sunset time, unbroken grains of rice smeared with little cow ghee are put in the fire along with chanting of Mantras.

It is known that when specific substances are burnt in a copper pyramid with a specific mantra at the exact time of sunrise/sunset, a specific effect occurs. The fumes, smoke or vapors from the burning components rise high up in space. It gathers the nutritional properties and brings them down to earth benefiting all forms of life. The inverted pyramid pot is known to be a receiver of cosmic energy. Copper is the best conductor of heat and electromagnetic waves.

Referred as the mother of all medicines in the ancient times, ghee acts as a carrier of subtle healing energies. Raw unbroken full rice grain is just right to use, it being the most abundant food grain across the globe. The Agnihotra mantras in Sanskrit cause specific vibrations beneficial to the mind and the atmosphere.

Traditionally Agnihotra sacrifice requires intact (unbroken) *unpolished brown rice*, but for want of brown rice, my initial studies were performed using unbroken polished long grained *basmati* (a type of Indian rice with delicate fragrance). For earlier studies the combined effects of both agnihotra fumes and ash was studied together.

For the present study only *polished rice grains* were used for offerings during chanting of Mantras. And for clarity of results the effects of only the agnihotra fumes was studied, ash was not included in any of the experiment.

The experiments were performed on a covered balcony having walls on East and North side. While South side is fitted with iron mesh. Direct sunlight is coming from the South-west direction. The whole area has good amount of light throughout the year. The potted plants were getting direct sunlight and these were kept on a raised platform towards the south-west corner so as to capture more fumes of Agnihotra.

B. Experimental Design

Glass bottles in triplicate of three different sizes and shapes were taken. My experimental plant was money plant (*Epipremnum aureum*), also known as Pothos.

The money plants and the bottles from the previous experiments were used for this new study. For Control and the Experimental Plants, the same sets of bottles were used. The experimental and control plants had pre-formed roots; barring few which were in the form of new twigs removed from the same mother plant before the experiment; and hence had no roots

In the earlier published study it was shown that narrow-mouthed bottles had produced better growth both in terms of number of leaves and length of internodes. In this experiment 3 sets of bottles were used: 1-narrow-mouthed glass bottles; 2-wide-mouthed glass bottles, 3-narrow-mouthed plastic bottles both for control and fume-exposed plants.

Control Group:

A1, A2, A3

B1, B2, B3

C1, C2, C3

Exposed Group:

A1' A2', A3'

B1' B2' B3'

C1' C2' C3'

D1

The flower vase made up of an opaque material (A1') also served as an additional control.

For around one month before the experiment began, the Agnihotra procedure was stopped so as to adjust the plants to the normal conditions and Agnihotra was started so as to commence with the start of experiments and noting of observations.

One bottle from experimental group and control group was wrapped with black colored plastic sheet. The experiment was started on 10th November 2013 evening and concluded on 9th December 2013 evening. For all the days plants were exposed to the Agnihotra fumes generated through the offering of polished unbroken rice grains along with the chanting of Mantra exactly at the time of sunrise and sunset. No ash was used in the

experiment.

The money plants used as control were kept outside the house at the same height and the same air and light conditions like the experimental plants, however, these plants did not have any exposure to Agnihotra fumes.

Results and Discussion

A. Observations in Experimental Money Plants

a. Production of New Leaves in Money Plants

It was observed that Agnihotra fumes had different effects on different plants. However, production of new leaves was observed in most of the money plants kept in Agnihotra atmosphere. It seems that initiation of cell division to form new structures is the primary effect of agnihotra vapor. In this study the effect of agnihotra fumes (arising from the offering of polished rice grains in the sacred fire of Agnihotra) on bottled money plants was studied and as shown in Table 2.

Observations in Table 2 have shown that new leaves were formed earlier in narrow bottles as compared to broad mouthed bottle kept in agnihotra atmosphere. Only one plant out of the three broad mouthed bottles produced new leaf, which has yet not opened. Whereas all the three narrow mouthed bottles produced new growth. This is in confirmation of previous study where narrow mouthed bottles produced more number of leaves (Figure 5). In the opaque flower vase also new leaf growth was observed (Figure 7).

In control plants the new leaf production was observed only in narrow mouthed bottle covered with black sheath (Figure 6). This confirms the fact that when roots are unable to grow in absence of light, the balance is shifted towards the formation of shoot. Agnihotra fumes produced with the polished rice grains are shifting this balance towards the production of shoot as already proved in previous study. Most cases where roots are growing, as in wide mouthed glass bottle (Table 1: Row 6 and 7) the roots are long taproots.

This also explains why wide mouthed bottles in the exposed group are not producing new leaves; the vapor or fumes in this case are probably dissolving in water to produce more roots. The big wide-mouthed glass bottle in exposed group is having the longest roots (Table 2:Row 7)

Comparisons of Table 1 and Table 2 shows that formation of new leaf had taken in place more than 50 percent of bottles in the exposed group, as compare to control group in which new leaves formed inside the ochrea had dried over the time.

b. Agnihotra's effect on money plants having no roots

The new plants which were removed from

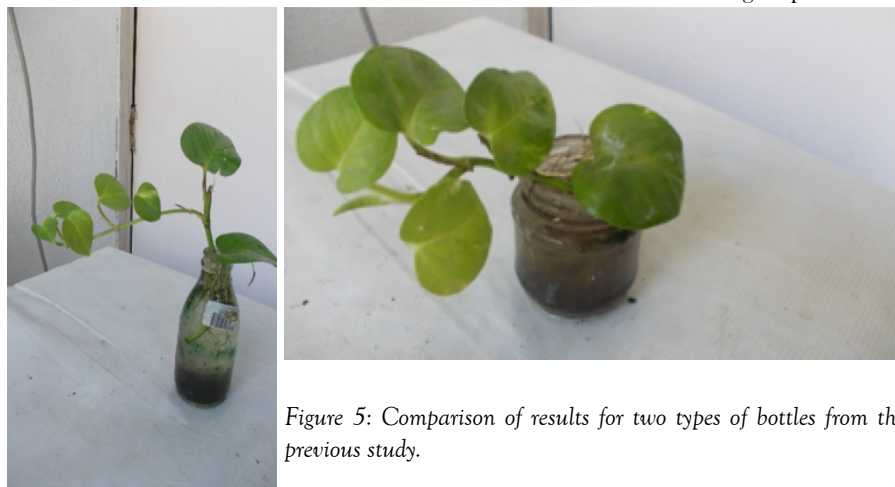


Figure 5: Comparison of results for two types of bottles from the previous study.

the same mother plant had a new leaves enclosed tightly in the sheath. After removing from the mother plant they were then divided into **experimental plants** and **control plants**. The control plants had produced little root growth as compare to the experimental plant. The ochrea (sheath) enclosing the new leaf had dried in both the control plants. But in the experimental plant leaf inside the sheath had shown growth (Figure 8).

The pattern of growth in experimental and control group is self-explanatory. In plants exposed to agnihotra fumes, the distance between nodes has also increased along with increase in leaf size. It also points out the fact that though leaves absorb the fumes, the roots help in nutrition of leaves through absorbing water (Figure 8).

Senescence, yellowing of leaves was observed both in control and experimental plant, but only in experimental plants the senescence of old leaf was associated with the formation of new leaves. This has again confirmed the results of previous studies. It was also observed that in exposed plants the old leaves were fallen soon after yellowing, however in control plants it kept sticking to the plants for a long time.

B. Observations in other plants

All the plants, which were exposed to Agnihotra fumes were not supplemented with any kind of fertilizers externally.

a. Observations in an inflorescence producing plant

1. Increased foliage production in green ornamental plants with variegated leaves.
2. Increased senescence (Figure 9) and production of new leaves at the bottom (Figure 10) after the initiation of flowering structures (inflorescence).
3. The control plant however did not show production of any inflorescence neither it showed any senescence.

b. Observations in Rose Plant

1. Before start of the experiment the rose plant and had no

buds. The Rose plant had earlier shown the formation of flowers in the month of September; however, 15 days before the start of experiment the plant had no bud or flower seen on it.

2. New leaves were continuously forming after exposure. After 10 days exposure red tinged leaves were forming in increased numbers.
3. Bud formation was seen at the tip of newly formed shoots.
4. The most characteristic observation was that the new shoot was formed at the base after continued exposure (Figure 11, It confirms the criterion of breaking of the apical dominance). In 3 days time it grew in height to the same level as old branches, which were about 2 & half feet high. The older braches formed one bud at the top, but the newly formed shoot divided and formed 4 buds at the top (Figure 12).
5. The rose flowers produced were bigger in size as compare to the flowers that were produced earlier on plants.

c. Observations in Chrysanthemum Plant

Two twigs similar in size and structure were collected from the same mother plant. One plant was planted in the balcony where agnihotra was performed, the other however, was planted on a balcony having the same height and lighting conditions but it did not receive any exposure to agnihotra vapor.

1. Agnihotra was started only after the plant had adjusted to the place for around 2 months.
2. Earlier to the exposure to the vapour, the plant was green and the leaves were growing alternately.
3. After 7-8 days exposure there 4 scale-like leaves were seen around each leaf starting from the bottom.
4. After that the two new leaves were formed in the axil of each old leaf. The stalk of these leaves became very tall suddenly and produced 2 buds. Each bud had scale like appendage at the base.
5. Out the 2 leaves that were initiated after exposure one leaf was differentiated into its proper structure the other was small and undifferentiated confirming the differentiation of lateral leaf into the bud.

6. Buds were produced around the same time as in rose plant, around 25th November (Figure 14).
7. No senescence was observed in the plant. It had produced the buds for the first time.
8. A comparison of this plant with the control will show that the control plant has not produced any buds (Figure 13).
9. Difference can also be observed in distance (internodes) between two

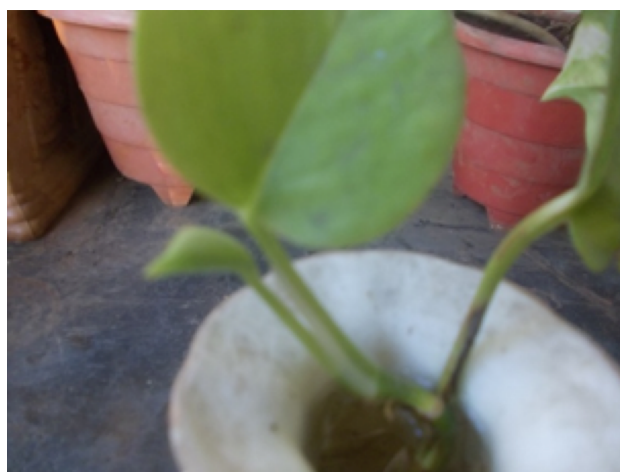


Figure 6 & 7: Production of new leaves

Table 1: Observations: (Money Plant) Control Group (Receiving no exposure to Agnihotra fumes)

S.No.	Type of Bottles (1-6) Glass (7-8) Plastic 9-Glass	10 th Nov, 2013	17 th Nov, 2013	24 th Nov 2013	2 nd Dec, 2013	9 th Dec, 2013
1 A1	Narrow-mouthed Bottle	Roots: Fine fibrous roots Foliage: (5- 2 big 2small, one young leaf curled up)	Roots: Fine fibrous roots Foliage: (One old leaf showing Senescence) One leaf yet curled	Roots: Fine fibrous Foliage: (4+ 1 fully senescent leaf) The young leaf opened	Roots: Fine fibrous roots Foliage: (4+ 1 old leaf totally shrunk yet attached)	Roots: Fine fibrous roots Foliage: (4) 2 leaves with dried and yellowed Ochrea (sheath) Result: No new leaf formed
2 A2	Narrow-mouthed Bottle (Wrapped in black sheet)	Roots: Fine fibrous roots Foliage: (4-medium sized leaves)	Roots: Fine fibrous roots Foliage: 4 leaves	Roots: Fine fibrous Foliage: (4+ New leaf seen in the ochrea (sheath))	Roots: Fine fibrous Foliage: (4+ 1 new leaf showing increase in size)	Roots: Fine fibrous Foliage: (4) Result: New leaf formed
3 A3	Narrow-mouthed Bottle	Roots: No root Foliage: (3-medium sized leaves)	Roots: 1 inch long tap root formed at the node opposite to stalk of leaf Foliage: 3 leaves, one new leaf seen enclosed in ochrea	Roots: 2 inch long thick tap root Foliage: (3) No growth observed in the enclosed leaf	Roots: > 3 inch long tap root Foliage: (4) The leaf and sheath turning yellow	Roots: 4 and half inch long thick tap root Foliage: (3) One leaf fallen Result: No new leaf seen
4 B1	Wide-mouthed Bottle	Roots: Long slender roots Foliage: (2-small sized leaves)	Roots: No change Foliage: One leaf showing Senescence	Roots: No change Foliage: Drying of the senescent leaf	Roots: No change Foliage: (2) One leaf fallen	Roots: No change Foliage: (1) Result: No new leaf formed
5 B2	Wide-mouthed Bottle	Roots: Thick long roots Foliage: (3-medium sized leaves)	Roots: No change in number of roots Foliage: No change	Roots: No change in number of roots Foliage: No change	Roots: No change Foliage: No change	Roots: No change Foliage: (3) Result: No new leaf formed
6 B3	Wide mouthed big Bottle	Roots: No root Foliage: 2 Big leaves	Roots: Initiation of root formation Foliage: No change	Roots: Twin roots(2.5" and 3" long) seen on same side of node Foliage: no change	Roots: Twin roots 3" & 4" long Foliage: no change	Roots: Twin roots of same length 4.5" Foliage: no change Result: No new leaf formed

Table 1: Observations: (Money Plant) Control Group (Receiving no exposure to Agnihotra fumes) (Continuation....)

7		Roots: No root	Roots: No root formation	Roots: No root formation	Roots: No root formation	Roots: No root formation
C1	Narrow-mouthed plastic bottle	Foliage: (3) small leaves (One leaf inside the ochrea)	Foliage: (3) small leaves (One leaf inside the ochrea)	Foliage: (3) small leaves No change observed in the leaf inside the sheath	Foliage: (3) small leaves. No change observed in the leaf inside the sheath	Foliage: (3) small leaves, the leaf inside the sheath dried up. Result: No new leaf formed
8		Roots: fine fibrous roots	Roots: fine fibrous roots	Roots: fine fibrous roots	Roots: fine fibrous roots	Roots: fine fibrous roots
C2	Narrow-mouthed plastic opaque bottle	Foliage: 4 small leaves	Foliage: No change	Foliage: One leaf turning senescent	Foliage: 3+ Senescent shrunk leaf	Foliage: 3+ Senescent shrunk leaf totally shriveled Result: No new leaf formed
9		Roots: 4 very long slender roots	Roots: roots becoming longer	Roots: roots becoming longer	Roots: roots becoming longer	Roots: roots becoming longer
C3	Narrow-mouthed long Glass Bottle	Foliage: One leaf	Foliage: No change	Foliage: No change	Foliage: No change	Foliage: No change Result: No new Leaf produced



Figure 8: See the difference between the length of internodes of control and experimental plant.



Figure 9: Increased senescence

alternate leaves and the production of new leaves. The difference can also be seen in the curvature the control plant is growing horizontally, however the exposed plant is growing vertically (Figure 14).

The experiment was stopped after one month's exposure, the rose plant, which had earlier produced flowers, had flowers produced from the buds, and however, the *Chrysanthemum* plant the buds have not yet opened.

d. Senescence, formation of new leaves and other effects of Agnihotra vapor

In rose plant new shoots were produced along with increased senescence of old leaves. In normal course the red-tinged new shoots are formed at the tip of old



Figure 10: New leaf growth at the bottom (breaking of apical dormancy)

Table 2: Observations Experimental Bottles (Money Plant-the group exposed to Agnihotra fumes)

S No.	Type of Bottle	10 th Nov, 2013	17 th Nov, 2013	24 th Nov, 2013	2 nd Dec, 2013	9 th Dec, 2013
1 A1'	Narrow Opaque Glass Vase	Roots: extensive network of thin fibrous roots Foliage: 2 big leaves	Roots: No change Foliage: No change	Roots: extensive thin fibrous roots Foliage: Small bulge seen at the base of young leaf	Roots: Juvenile fine roots seen emerging Foliage: New leaf emerged but yet curled	Roots: Juvenile roots becoming longer Foliage: Increase in the length of petiole of new curled leaf Result New leaf formed
2 A2'	Narrow-mouthed Glass Bottle	Roots: Thick long roots Foliage: 4 (one big, 2 medium sized, one small)	Roots: Thick long roots Foliage: One big turning senescent New leaf seen inside the ochrea	Roots: Thick long roots Foliage: Big leaf fallen New leaf fully opened	Roots: No new roots seen Foliage: The size of the newly formed leaf became greater than the leaf already present	Roots: No new roots seen Foliage: The length of petiole of new leaf becoming longer Area of the new leaf increases Result New leaf seen
3 A3'	Narrow-mouthed Glass Bottle wrapped with black plastic sheath	Roots: Thin long roots Foliage: 2 (one big one very small leaf seen at the node opposite to roots)	Roots: Thin long roots Foliage: Big leaf turning senescent, New leaf in form of a shoot (Not seen enclosed in ochrea) seen emerging	Roots: Thin long roots Foliage: The big leaf fallen Petiole of the new leaf becoming longer	Roots: No change seen in the roots Foliage: The big leaf fallen Size of the newly formed leaf smaller than already present leaf	Roots: No change seen in the roots Foliage: 2 Result: New leaf formed but smaller in size
4 B1'	Wide-mouthed glass bottle	Roots: thick roots Foliage: 3 big leaves	Roots: 5-6 thick roots Foliage: Biggest leaf turning yellow at the corner	Roots: 5-6 thick roots Foliage: No progress in yellowing of the leaf	Roots: Thick roots Foliage: No change	Roots: Thick roots Foliage: 3 No change Result: No new leaf formed
5 B2'	Wide-mouthed glass bottle	Roots: Fine fibrous roots Foliage: 2 small leaves, one leaf slightly yellow	Roots: No characteristic change observed Foliage: No change	Roots: No change observed Foliage: No change	Roots: No change observed Foliage: No change	Roots: No change observed Foliage: 2 No change Result: No new leaf produced
6 B3'	Wide-mouthed glass bottle	Roots: Fine long roots Foliage: 3 medium sized leaves	Roots: No characteristic change observed Foliage: No typical change seen	Roots: No typical change Foliage: New leaf seen inside the sheath	Roots: No typical change seen Foliage: New leaf emerged but yet curled	Roots: No typical change seen Foliage: 4 New leaf emerged but yet curled Result: New leaf formed
7 B4 (Similar to B3 of control)	Wide-mouthed big glass bottle	Roots: No roots Foliage: 2 leaves	Roots: 1" long twin roots seen Foliage: No change	Roots: 3" long twin roots seen, another 1" long root was seen Foliage: No change	Roots: The newly formed root had become 4" long Foliage: No change	Roots: The newly formed root has become around 6 inch long. The other roots are 4 inch and 2 inch long No new leaf produced Foliage: 2 No change Result: No new leaf

Table 2: Observations Experimental Bottles (Money Plant-the group exposed to Agnihotra fumes) (Continuation..)

8		Roots: No roots	Roots: root growth initiation	Roots: The new root becoming longer	Roots: 2" long root	Roots: 4" long root
C 1'	Narrow-mouthed plastic bottle	Foliage: 3	Foliage: New leaf seen inside the ochrea	Foliage: Bulge in the ochrea increases in size	Foliage: Bulge in the ochrea increases in size	Foliage: 3 Bulge in the ochrea increases in size Result: New leaf formed
9		Roots: No roots	Roots: No root initiation	Roots: No root initiation	Roots: Whitish juvenile root seen emerging	Roots: 1" long root
C2'	Narrow-mouthed plastic bottle	Foliage: 3	Foliage: 3	Foliage: The topmost leaf becomes broader than the leaf below it The leaf inside the ochrea turned black	Foliage: The topmost leaf becomes broader than the leaf below it	Foliage: 3 The topmost leaf becomes broader than the leaf below it. The new leaf turns black Result: No New leaf formed
10		Roots: No roots	Roots: No root formation	Roots: little root initiation	Roots: twin root formation on single side of the node	Roots: 1" long roots seen
D	Narrow Big Plastic Bottle Kept in sun	Foliage: 2	Foliage: 2	Foliage: No change	Foliage: No change	Foliage: No change Result: No New leaf formed

branches. The formation of new shoot at the bottom points towards breaking of apical dominance (Figure 11). The initiation of lateral shoots formation was also observed in previous study (Figure 4). The bottom shoot growing up very long in short period in rose plant suggests **cell elongation** as another effect of agnihotra vapor. The vertical growth in *Chrysanthemum* plant also proves this fact along with the change in curvature of the plant (Figure 14).

Senescence was also observed in some of the other plants but its degree varied in different plants. In fact in plants where formation of inflorescence was initiated, senescence was more pronounced. In few plants most of the leaves were shed as an effect of senescence and then new leaves were produced at the bottom (Figure 10). In the axil these new leaves, again a pair of new leaves were formed. This effect has confirmed the results of previous study where Tulsi plant (*Ocimum*) was eventually destroyed in presence of polished rice grain vapour, as a result of increased senescence. Here senescence had occurred after the leaves had turned red with patches on them. Though the new leaves were produced at a high speed, the senescence was so fast that plant had almost died. This was not so before the agnihotra fumes were there.

Increased leaf production from the axillary buds confirms the triggering of increased cell division by agnihotra fumes. In the previous study the croton plant had also responded by increased proliferation (Figure 3). Here the degree of senescence was less. It seems that major effect of agnihotra is increased cell division and cell elongation as suggested by the new shoot produced at the bottom becoming equal to other shoots in 2-3 days time. Senescence is somehow the side effect of agnihotra vapour.

A mango tree outside the house but exposed to agnihotra fumes though open iron mesh had produced inflorescence and started bearing fruits. the plant had not produced inflorescence in the last 4-5 years.

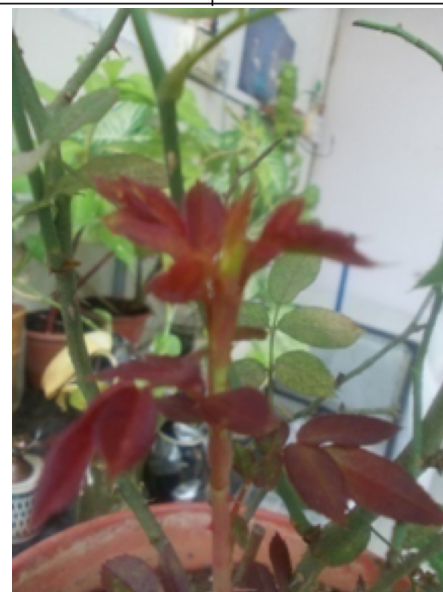


Figure 11: New shoot formation at the bottom



Figure 12: The new branch forming the buds

Conclusion

A. Possible Role of Phytohormone

The observations and results of the study conclusively prove that the effects on plants caused by fumes generated by offering of polished rice grains into the sacred fire of Agnihotra resemble that of plant regulator substances or the hormones which are light-dependent. Either the fumes are rich in such substances, which are being absorbed by leaves as well as roots, or the fumes are stimulating the production of such regulator substances in plants as a reaction to the exposure.

These effects produced particularly resemble that of phytohormones **Brassinolides**, which are known to promote cell elongation, stimulate flowering, promote cell division and can affect the tropic curvature [15]. Brassinolides are plant **steroids** (many animal hormones are steroids) that may be involved in the light-induced expression of genes [16].

By virtue of this resemblance and effects, the Vedic procedure holds immense promise in the field of agriculture and tissue culture.

B. Comparison with Other Results Published

Observations and the result of the experiment carried out during the study try to offer a scientific background for the effects of Agnihotra. All the previous studies carried out so far have mainly been focusing on agnihotra ash for offering benefits like increase in solubility of phosphorus for explaining the positive benefits of Agnihotra on plant growth. However, the scientific rationale behind the effects of Agnihotra fumes on plants or agricultural crops has not been explained in proper scientific terms so far. My results are conclusively pointing out that (changes like cell division, lateral bud initiation, breaking of apical dormancy, initiation of flowering in plants, senescence) are mediated through generation of hormone like substances in exposure to agnihotra fumes.

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Figure 13: Control Plant



Figure 14: Production of buds in the exposed plant

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Authors Column

Vasanti Gopal Limaye

Presently, I am engaged in research on Agnihotra which holds good promise in cleansing of the environment. Since it is done at the exact time of sunset and sunrise it helps a great deal in realignment of our Circadian Rhythm. I work as freelancer taking up editing and writing jobs. I have keen interest in Music, Environment, Yoga and Spirituality. Earlier I was working as project associate at Center for Environment Education, India. That time I had prepared a proposal and presentation for Effluent treatment plant for Hospitals in association with biotechnology department at IIT Delhi, India. I had also contributed articles for newsletters on Hospital Waste Management.



About my Research

I was led into Agnihotra research through some chance observations. After that I designed some simple experiments to assess the role of agnihotra vapor and ash. It was seen that agnihotra ash was stimulating root growth and arresting the shoot growth when added in excess to bottled plants. The present paper discusses the effects of vapor generated through the offerings of polished rice grains in the sacred fire of Agnihotra. It produced effects like increased cell division, leaf proliferation, initiation of lateral buds, breaking up of apical dominance, cell elongation etc.

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