

# Introduction of SOMRE Compounds

(Plant's Root Promoter and Medicine of the Earth for Combating Desertification)

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## 1. Introduction

This is a brief introduction of SOMRE compounds. Here described is a limited range of their application to plants and vegetables. It's our pleasure if readers have interest and cooperate to find further application of SOMRE compounds to various plants, such as mushrooms, flowers, vegetables, trees, fruits, spices, herbs, medical herbs, wind break forests, extinction anxiety plants, and so on. If there is a request from you, we can offer a free sample of SOMRE No.1 after making contract.

## 2. SOMRE compounds<sup>1-5)</sup>

We have developed a group of compounds that help promote elongation of plant's roots. These compounds are chemically classified as the derivatives of indole-3-carbaldehyde that is known as one of the metabolite of essential amino acid, tryptophans, in our body. We named these compounds SOMRE compounds after the following three words, somei, root, and elongation.

## 3. Safety

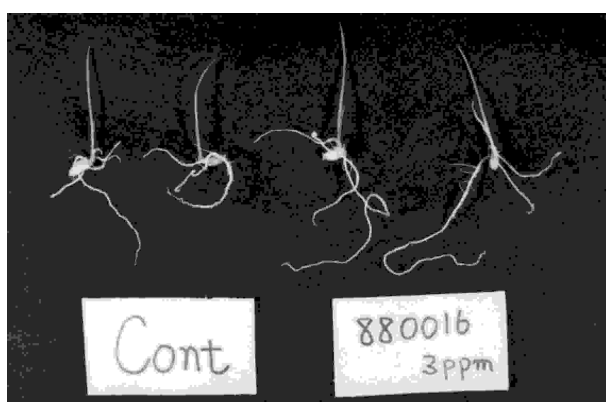
SOMRE compounds are essentially safe compounds. In addition, they are used for soaking seeds and roots as a diluted solution in concentration of 1.0—0.001 ppm (part per million) that is diluted enough to be never harmful to human and animals. The density of residual-prone SOMRE compounds in harvest is the degree that we can ignore. Mice and rabbits in Gobi desert, Inner Mongolia, ate willingly the plants that grew from the pretreated seeds with SOMRE, proving no toxicity. There was no healthy trouble when we ate tomato which were harvested from the SOMRE treated plants.

## 4. Effects of SOMRE compounds upon the elongation of plants' roots

### 4-1. Rice Nihonbare and cucumber Sagamihanpaku<sup>1-5)</sup>

SOMRE compounds help extend the roots of both rice and cucumber. The former is a representative of monocotyledonous plant and the latter is a representative of dicotyledones plants. As shown in the photograph (Figure 1), the aqueous solution of SOMRE No.1 lengthened the roots of rice (Poaceae), longer than that of the control in its seedling test.

**Figure 1.** Rice Nihonbare Seedling Test



Control ↑

↑ Aq. SOMRE No.1

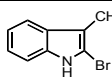
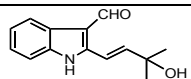
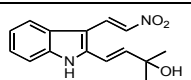
All the data are summarized in Table 1. In the case of 3 ppm aqueous SOMRE No.1 solution, the roots of rice become 168% length compared with those of the control. If SOMRE No.16 and

14 were applied, the roots are longest at the 50 ppm concentration achieving 146 and 168% length, respectively.

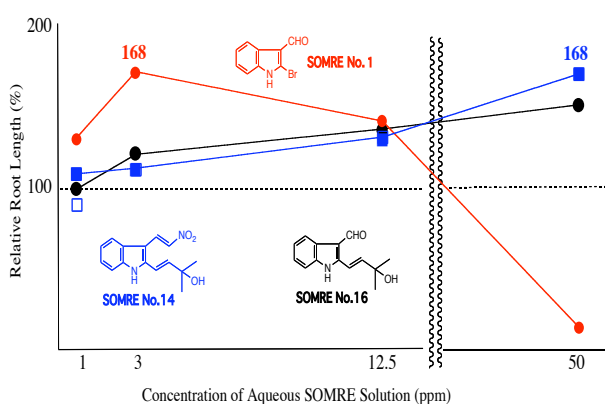
In the case of cucumber, SOMRE No.1 is not so effective. At the concentration of 3 ppm, the roots become 113% longer than the contrast. Similar results are observed in the use of SOMRE No.16. However, when SOMRE No.14 is employed at the concentration of 3 ppm, the roots become 190% longer than the contrast.

These results are easy to understand when these data are expressed in such line graphs as Figures 2 and 3. As can be seen from Figure 2, SOMRE No.1 effects the top length of rice roots at 3 ppm among other concentrations. For the growth of cucumber, Figure 3 clearly demonstrates that the 3 ppm aqueous solution of SOMRE No.14 is the best among other conditions.

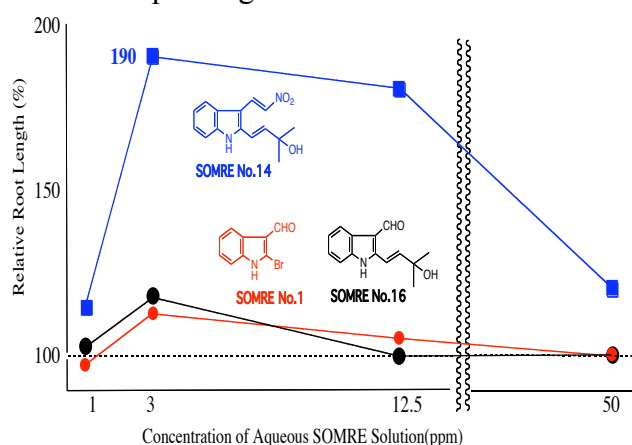
**Table 1.** Average Root Length of Rice and Cucumber Effected by Aqueous SOMRE Compounds Depending on Their Concentrations

Plant and Root Length of the Control	Rice (Nihonbare) Control: 46.8 mm (100%)				Cucumber (Sagamihanpaku) Control: 12.1 mm (100%)			
	Concentration of Aq. SOMRE (ppm)				Concentration of Aq. SOMRE (ppm)			
	50	12.5	3	0.8	50	12.5	3	0.8
 <b>SOMRE No.1</b>	14	140	<b>168</b>	130	100	105	<b>113</b>	98
 <b>SOMRE No.16</b>	<b>146</b>	136	120	100	100	100	<b>118</b>	101
 <b>SOMRE No.14</b>	<b>168</b>	133	113	109	120	180	<b>190</b>	114

**Figure 2.** Average Root Length of Rice Nihonbare (Poaceae) Effected by Aqueous Solution of SOMRE Compounds Depending on Their Concentrations



**Figure 3.** Average Root Length of Cucumber (Cucurbitaceae) Effected by Aqueous Solution of SOMRE Compounds depending on Their Concentrations

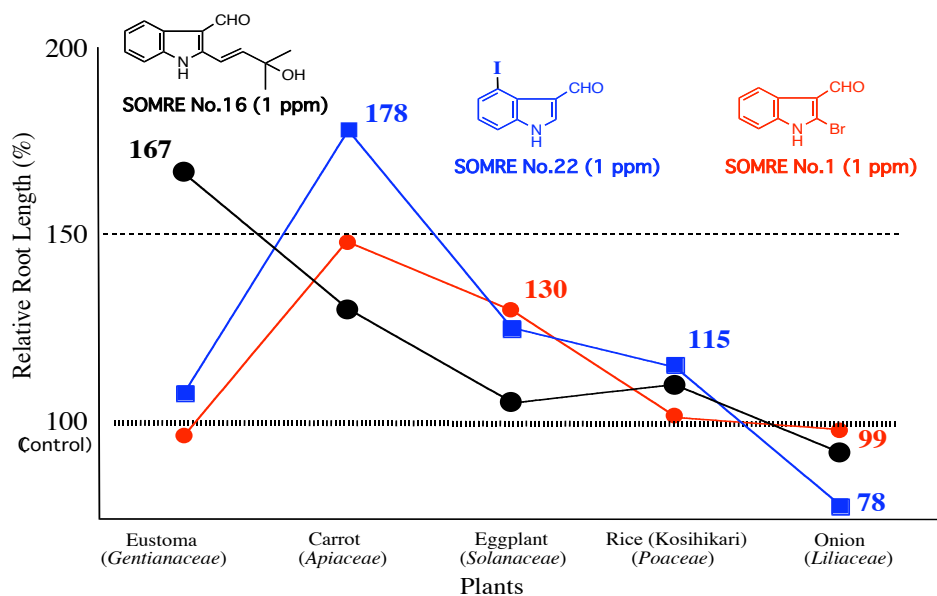


## 4-2. Effects of SOMRE compounds upon various plants<sup>5)</sup>

### 4-2-1. Eustoma (Gentianaceae), carrot (Apiaceae), eggplant (Solanaceae), rice (Poaceae), and onion (Liliaceae)

Effects of 1 ppm aqueous solutions of SOMRE No. 1, No. 16, and No.22 were examined upon the root growth of various plants' seeds and the results are summarized in Figure 4. When eustoma is chosen as plant's seeds, No.16 is the most effective and 167% longer roots are grown. In the case of carrot, No.22 is the promoter of choice. Average roots length reaches 178% times longer than the control. If the eggplant is employed, No.1 is the best. In the case of rice Kosihikari, No.22 again gives better results than No.1 and No.16. When onion is examined, all tested 1 ppm solutions of SOMRE give poor results than the control.

**Figure 4.** Effects of Aqueous 1 ppm Solution of SOMRE Compounds upon the Root Growth of Various Plants' Seeds



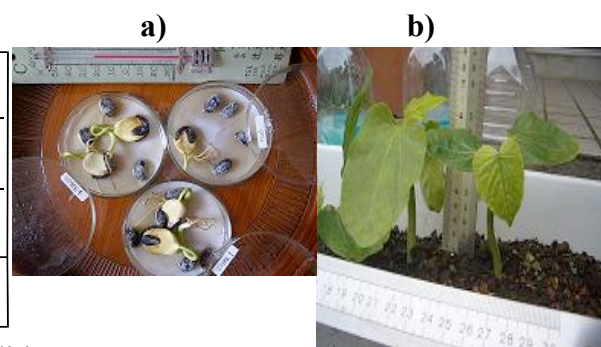
#### 4-2-2. *Jatropha curcas* (Euphorbiaceae)

Nowadays, *Jatropha curcas* attracts much attention as vegetable biodiesel fuel and save the future shortage of energy. Five seeds in each laboratory dish were treated with 1 ppm aqueous SOMRE No.1, No.4, and water (control). The results shown in Table 2 shows that SOMRE No.1 helps quicken the day of germination compared with the control. Germination rate are also improved as shown in Figure 5-a). Germinated seeds were transplanted to a planter. On Nov. 6, SOMRE treated plants are growing bigger than the control (Figure 5-b)). However, during cold winter season, they all froze to death.

**Table 2.** Germination of *Jatropha curcas* (Euphorbiaceae)

	Day of Germination	Germination Rate on Sept. 24. (%)
Control	Sept. 24 (4 days after soaking)	20%
SOMRE No.1	Sept. 22 (2 days after soaking)	40%
SOMRE No.4	Sept. 23 (3 days after soaking)	40%

**Figure 5**



Sept 20—Sept 26, 2007, 25—30°C, day and night conditions.

### 4-3. Application to other plants

Application of aqueous SOMRE compounds to pine trees (Pinaceae), sword bean, *Cryptomeria japonica* (Cupressaceae), Chinese medicine such as *Forsythia viridissima* (Oleaceae) and *Glycyrrhiza* (Fabaceae), lawn, etc are now in successfully progress in 2009. Preliminary field experiment of Japanese radish and Chinese cabbage are now under investigation. The results will be introduced in due course.

### 4-4. Summary of the section 4

Judging from the results obtained in 4-1 section, we can conclude that there exists a suitable concentration for each SOMRE compounds to help the plants' roots grow longest. The findings in 4-2 section clearly show that different plants require a specific SOMRE compound for their own, respectively, for attaining sufficient root growth. Even if the plant belongs to the same family, the different species needs different SOMRE as shown in the cases of rice Nihonbare and Koshihikari.

Therefore, before application, we should find out the specific SOMRE compound and its suitable concentration for each plant.

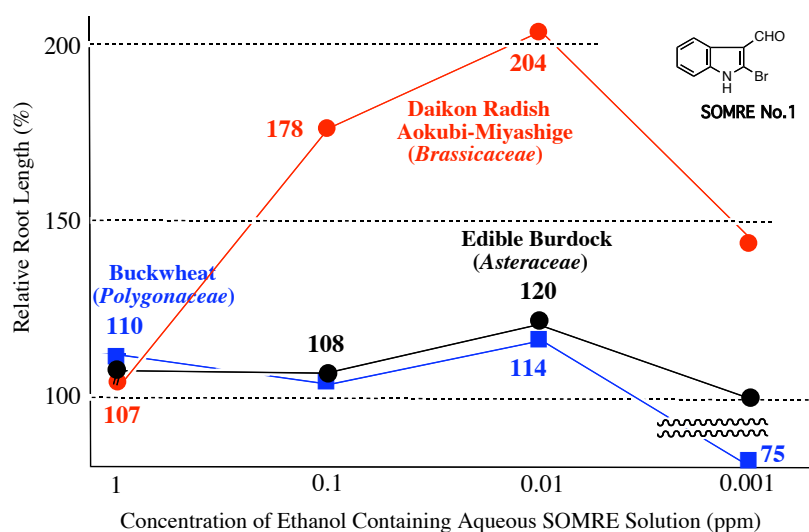
## 5. Application of ethanol containing aqueous SOMRE No.1 to various plants

In this section, an ethanol containing aqueous solution of SOMRE is introduced. Since the SOMRE compounds are oil soluble material, it is easy to make an ethanol containing solution than making ethanol-free solution. However, an application range of an ethanol free aqueous SOMRE is wider than the ethanol containing one because an ethanol is sometimes not suitable to some kinds of plant. Ethanol content is a crucial factor. The followings are successful examples.

### 5-1. Daikon radish (Brassicaceae), edible burdock (Asteraceae), and buckwheat (Polygonaceae)

The effects of an ethanol containing aqueous SOMRE No. 1 upon plant's seeds are summarized in Figure 6.

**Figure 6.** Average Root Length of Plants Effected by Ethanol Containing Aqueous Solution of SOMRE No.1 Depending on Their Concentrations



Daikon Radish, Aokubi-Miyashige, is a typical example and shown in red circle and lines. Average roots' length reaches top length and 204% longer than the control at the concentration of 0.01 ppm. Similarly, at the density of 0.001 ppm, edible burdock (shown in black circle) and buckwheat (shown in blue square) demonstrated the peaks, 120% and 114%, respectively.

### 5-2. Soybean (Fabaceae)

In the case of soybean, roots of young trees are dipped into the 1 ppm ethanol containing SOMRE No.1 solution for 1 hour and cultivated from June 7<sup>th</sup> to Aug. 16<sup>th</sup>, 2009. The crop of soybean per one stem is shown in Table 3.

Average numbers of shells and peas in a shell obtained from SOMRE treated plants are clearly better than those of the control. The former reaches 153% and the latter 106%. Consequently, total number of peas is 162% and their taste was better than that of the control. We missed to measure the weight, but their size were almost the same judged by touching before eating them.

**Table 3.** Crop of Soybean (Fabaceae) per One Stem

	Average Number of Shells (%)	Average Number of Peas in a Shell (%)	Total Number of Peas (%)
Control	33.6 (100%)	1.8 (100%)	61.6 (100%)
SOMRE No.1	<b>52.0 (153%)</b>	<b>1.9 (106%)</b>	<b>100.0 (162%)</b>

### 5-3. Tomato (Solanaceae)

In the case of tomato, roots of young trees are dipped into the 1 ppm ethanol containing SOMRE No.1 solution for 1 hour and cultivated from April 30<sup>th</sup> to Sept. 16<sup>th</sup>, 2009. The crop of tomato per one stem is shown in Table 4.

Average numbers of fruits and weight of a fruit obtained from SOMRE treated plants are demonstrated to be better than those of the control. The former is 188% and the latter 110%. Their taste was sweeter than that of the control.

**Table 4.** Crop of Tomato (Solanaceae) per One Stem

	Average Number of Fruit (%)	Average Weight of a Fruit (%)
Control	10.6 (100%)	114 g (100%)
SOMRE No.1	<b>20.0 (188%)</b>	<b>125 g (110%)</b>

## 6. Application of SOMRE No.1 for combating desertification<sup>1-5)</sup>

Now, we have created SOMRE compounds with the possibility that could achieve our dream for making desert green and food increase in production, and finally for stopping the global warming.

### 6-1. Watermelon in Kalahari Desert, Africa<sup>5)</sup>

In Kalahari desert, wild watermelon plays an important role for a local people as resources to

get precious water. Table 5 summarizes the results regarding to watermelon seeds from Kalahari desert using aqueous SOMRE No. 1. The experiment was carried out between Aug.19—Aug. 25, 2007 under day and night conditions. On Aug. 23 seeds germinated at a time. Fig. 7-a) is the photo taken on Aug. 24. The seeds were allowed to stand until Aug. 25 and then transplanted to garden. On Nov. 28, fruits were harvested and shown in Fig. 7-b). The left edge is the fruit from control. The second and third fruits from the left are from 1 ppm SOMRE treated seeds, while the first and second ones from the right are from those of 0.1 ppm.

It is evident that aqueous 1 ppm solution of SOMRE No.1 helps the seeds germinate and grow effectively, and produce healthy fruits. Applications of SOMRE to various wild plants, grains, and edible plants help people in Kalahari desert to produce much foods. Thus, SOMRE will be useful for local people to live a peaceful life.

**Table 5.** Germination of Watermelon Seeds from Kalahari Desert Using Aqueous SOMRE No. 1

	Control	1 ppm	0.1 ppm	0.01 ppm	0.001 ppm
Germination Rate on Aug. 25. (%)	20%	100%	60%	60%	60%

**Figure 7**



a) Aug. 24



b) Harvested on Nov. 28, 2007. The left edge is the fruit from control. The rest fruits are from SOMRE treated seeds.

### 6-2. Plants in Gobi Desert, Inner Mongolia<sup>1-5)</sup>

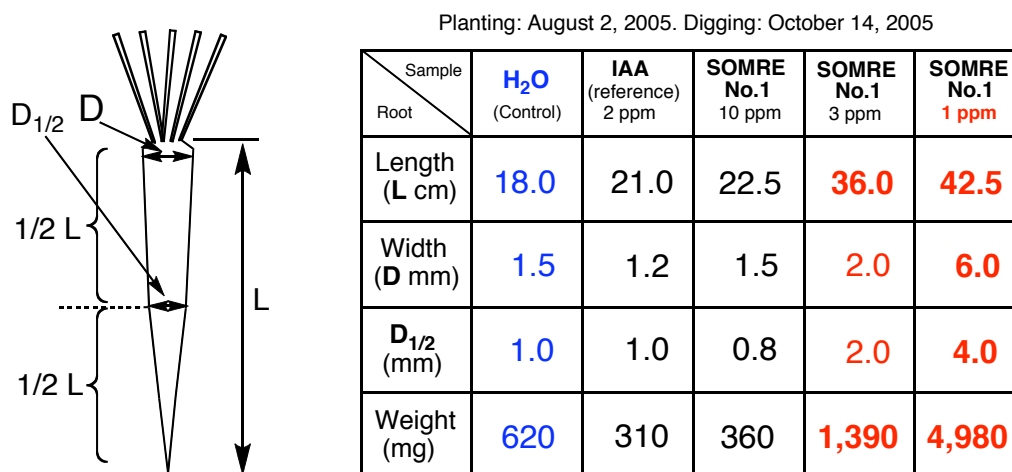
In recent years Gobi desert in Inner Mongolia in China is spreading rapidly. It is crying necessity for all life living on earth to stop global warming and to prevent the outbreak of the yellow sand from this area, which pours into any place not only Japan but also all nations on the earth. The best way to cure the global warming is to make the desert and sterile land green with full of plants that absorb carbon dioxide.

With our data shown in sections 4 and 5 in hand, we have performed 11 times of preliminary experiments from July 2005 to August 2009 at Gobi desert in Inner Mongolia with the cooperation of an NPO group and the local government. We applied aqueous solution of SOMRE No.1 to seeds of wild plants, such as *Hed ysarum scoparium* (Fisch et C.A. Mey) and *Calligonum alaschanicum* (a kind of sand jujube) at Gobi desert and tried root elongation test

repeatedly.

In the typical trial, seeds were divided into 5 groups. Each group was dipped into the 1, 3, 10 ppm aqueous solution of SOMRE No.1, a 2 ppm aqueous solution of IAA (the reference), and H<sub>2</sub>O (the control), respectively, for 30 min. Experiment farmland was divided into 5 equal parts as well. Seeds of each group were separately sprinkled to the divided farmlands on ditches of 5 cm depth and they were covered with sand. They were brought up for 73 days (from August 2 to October 14, 2005) under natural environment of the desert except for watering every one-week. We then dug out grown young plants and compared the average root length. The results are summarized in Table 6. It clearly demonstrates that SOMRE No.1 has a remarkable effect on the growth of plant's root. Especially at the concentration of 1 ppm, SOMRE No.1 encouraged the plant's root about 2.4 times longer and 8 times heavier than those of the control, respectively. The reference IAA gave poor results in accordant with other trials under various concentrations.

**Table 6.** Plant Growth for 73 Days at Gobi Desert in Inner Mongolia (*Calligonum alaschanicum*)



With these successful results in hand, we continued preliminary field test without watering under natural conditions to make Gobi desert green. Our compounds (SOMRE No.1, No.4, and related compounds) made the wild plant's roots longer enough to reach the moisture part that exists in the depth of around 30—40 cm from the earth surface of the desert.

At Gobi desert, it is well known that wild young plants, grown from the seeds during rainy season (annual rainfall: about 200 mm), must experience hot summer and then severe cold winter. Because of the shortage of root length, most of the wild young plants either dry or freeze to death. Therefore, the ability of making roots reach a moisture part of the underground during wet season decides the success or failure in living a life in desert. Such intrinsic plants' ability is encouraged with SOMRE compounds.

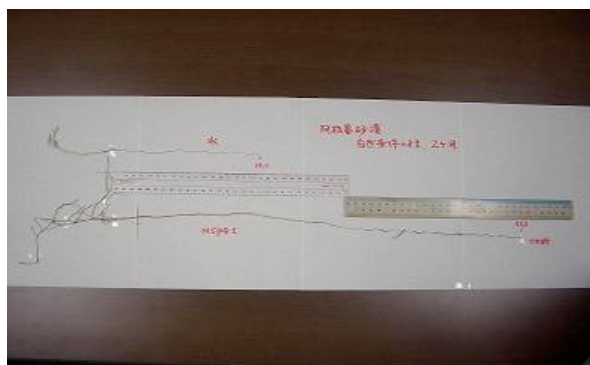
In between May 2006 and April 2007, we confirmed that young plants grown from the seeds of *Hedysarum scoparium* treated with aqueous SOMRE No.1 had sufficient root length, three times longer (53.2 cm) than that of the control (19.1 cm) as shown in Figure 8. They survived without freezing to death through cold winter. They gave bud in next spring and proved to be able to survive through a year! Of course they are growing in August 2009.



In April 2007, we dipped 2,700 young plant's roots of *Hed ysarum scoparium* into the 1 ppm aqueous solution of SOMRE No.1 for 30 min and planted them at about 2 hectares of Gobi desert. Under natural environment without artificial watering we observed their growth. Two months later, their survival rate is 87.6%, much better than 78.3% of the control group. They are growing bigger and fatter at present in Aug. 2009. Although the results are satisfactory success, the problem is the digging holes and planting trees in each of them in global size. That is impossible!

**Figure 8.** The Results of Field Test under Natural Conditions without Watering

Above two: control. Root length  
is 19.1 cm each. →  
Below: SOMRE treated root. Length  
is 53.2 cm. →



The first trial in the world was carried out throwing about 30,000 seeds on the flow dune surface of Gobi desert while walking in the end of May 2007. The seeds had been soaked in advance into the 1 ppm aqueous solution of SOMRE No.1. After having left them under natural conditions for two months, an impressive result was obtained at the beginning of August. The germinating rate was not 0%, instead surprisingly more than 0.1% and 30 young trees were growing.

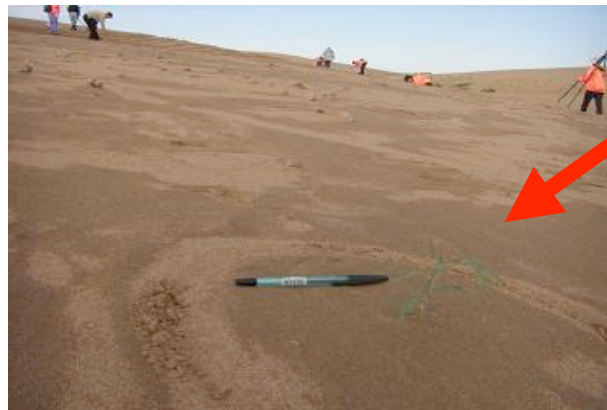
On May 17<sup>th</sup>, 2008, in the rainy season at Gobi desert, we made clay dumplings containing SOMRE treated seeds inside, a 1:1 mixture of *Hed ysarum scoparium* and *Calligonum alaschanicum* (Figure 9). Again we threw about 25,000 clay dumpling on the flow dune surface while walking. On October 5<sup>th</sup>, 2008, we found 127 young trees (about 1:1 mixture of *Hed ysarum scoparium* and *Calligonum alaschanicum*) growing under natural conditions. The germination rate rose up to 0.5% (Figure 10). By the end of May 2009, to our regret, moving flow dune covered over them with sand.

**Figure 9.** Making Clay Dumpling. SOMRE Treated Seeds are Inside.



**Figure 10.** 127 Young Trees Growing on the Surface of Flow Dune

Young tree of *Calligonum laschanicum*

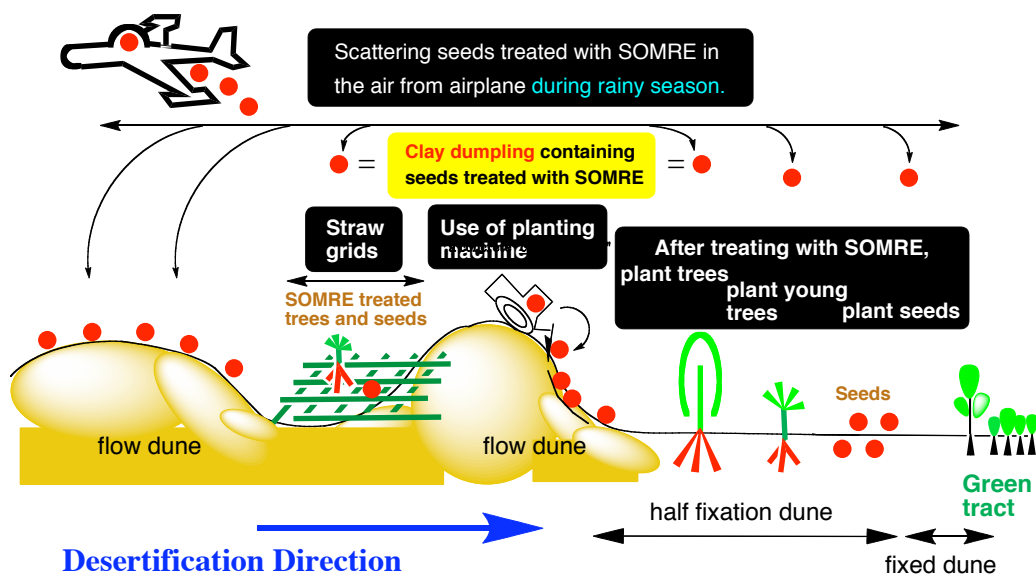


**7. Our Concrete Proposition for "The cure for The Earth"**

The results described in sections 6-1 and 6-2 demonstrate the possibility that the application of the SOMRE technology to a wide range of flow dune at a time by air plane can make the desert full of green plant. The application is not limited to Kalahari and Gobi deserts. The technique can be applied to all deserts in the world. From these point of view, we have proposed the following concrete proposition (Figure 11) to “the cure for the earth” at the international Bio Forum, held in Tokyo in July 2008.<sup>5)</sup>

Figure 11 illustrates the situation that desertification gets worse in the right direction. It is hard to find even one grass in the flow dune. On the front of the flow dune, there develops a fixed dune and a half fixation dune, and the latter connects to the green tract of land.

**Figure 11.** A Concrete Proposition to Change Desert back to Grassy Plain and to Stop Global Warming



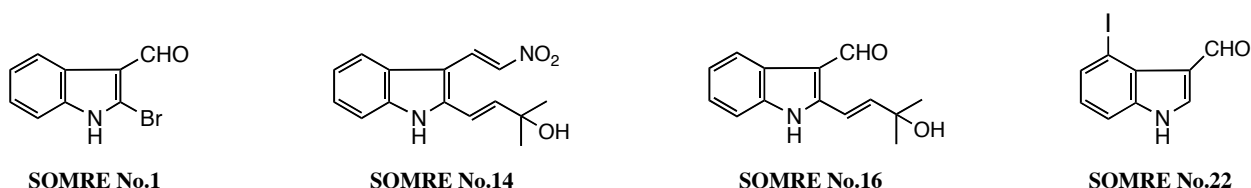
A concrete proposition for "the cure for the earth" is the following. First of all, roots of trees (a shrub, a large tree) and young trees, and seeds are soaked into an aqueous SOMRE solution. Then, before or during rainy season, trees are planted in a wide belt about 1 km away from the front of the flow dune. Next, young trees are planted at the green tract of land side. Subsequently, seeds are planted similarly. These three steps of placement is the method to meet the attack of the flow dune. In addition, the straw grids that are wisdom of ancient people are set in many places of the flow dune. Above trees and seeds are employed for planting in the grids. Furthermore, anyone can treat large land alone by employing tractor or planting machine.

The most effective method is the aerial scatter of clay dumping containing SOMRE treated seeds by airplane. This technique can change a wide range of flow dunes into a half fixation dunes at a stretch. Repeated trials would result in turning them to green lands and stopping outbreak of yellow sand. In the near future, a lot of newly grown trees and grasses absorb much quantity of carbon dioxide culminating in the stopping of global warming. Thus, we believe SOMRE compounds become "the medicine of the earth."

## 8. Chemical structures of SOMRE compounds

Of the 40 SOMRE compounds,<sup>2)</sup> the chemical structures of SOMRE No.1, No.14, NO.16, and No.22 are shown in Figure 12. Their preparations are based on our original intellectual properties starting from an industrial raw material, indoline.<sup>6)</sup>

**Figure 12.** Chemical Structure of SOMRE Compounds



## 9. Preparation of aqueous SOMRE solution

### 9-1. Aqueous SOMRE solution

#### 9-1-1. A preparation method for 1 ppm aqueous solution of SOMRE No.1

Put 1.0 mg of SOMRE No.1 into about 200mL of hot water<sup>7)</sup> (70–80°C) and dissolve it completely with shaking. Then add warm water<sup>7)</sup> (40–50°C) with shaking until the whole volume becomes 1.0 L. After the whole returned to room temperature, plant's roots or seeds can be soaked. Thirty minutes to one hour is enough time for soaking.

#### 9-1-2. A preparation method for 0.1 ppm aqueous solution of SOMRE No.1

Add warm water<sup>7)</sup> (40–50°C) with shaking to a 100 mL of the 1 ppm aqueous solution of SOMRE No.1 until the whole volume become 1.0 L. When the whole returned to room temperature, it can be used.

#### 9-1-3. A preparation method for 0.01 and 0.001 ppm aqueous solution of SOMRE No.1

A 0.01 ppm aqueous solution of SOMRE No.1 can be made similarly by diluting the 0.1 ppm aqueous solution of SOMRE No.1 following the above procedure. A 0.001 ppm solution is obtained as well.

## 9-2. An Ethanol containing aqueous SOMRE solution

### 9-2-1. A preparation method for ethanol containing aqueous solution of SOMRE No.1

A 10.0 mg of SOMRE No.1 is dissolved into 1 mL of ethanol.<sup>8)</sup> The resultant solution is added to about 2.0 L of hot water (70–75°C) with shaking. Then add warm water<sup>7)</sup> (40–50°C) with shaking until the whole volume become 10.0 L. After the whole returned to room temperature, it can be used as an ethanol containing 1.0 ppm aqueous solution of SOMRE No.1. Solutions of 0.1, 0.01, and 0.001 ppm can be prepared by dilution using warm water\* as shown in 9-1-2 and 9-1-3.

## 10. References and Notes

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7. Distilled or well water are recommended. In the case that city water was employed, boil it and do dechlorine, and use it. Chlorine is harmful to all plants.
8. An aqueous 75 to 80% ethanol is convenient to use.