

**The Kingdom of Morocco**

**OCP**

**The Kingdom of Morocco**

**Collaboration Program with the Private  
Sector for Disseminating Japanese  
Technology for ALA, Stimulating Natural  
Amino Acid for Quality-Improvement and  
High-Value Addition of Cash Crops as an  
Additional Element of Fertilizer Final  
Report**

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**Japan International Cooperation Agency**

**Cosmo Trade & Service Co., Ltd.**

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## List of Abbreviations

Abbreviation	Term
ALA	5- Aminolevulinic Acid
N	Nitrogen
OCP	Office chérifien des phosphates (Previous name and OCP is now the official name)
P	Phosphate
K	Kalium (= Potassium)
MAP	Monoammonium phosphate
DAP	Diammonium phosphate
Cosmo	Cosmo Energy Group (or previous Cosmo Oil Co., Ltd.)
Cosmo ALA	Cosmo ALA Co., Ltd.
Cosmo T&S	Cosmo Trade & Service Co., Ltd.

Figure 1: List of Abbreviations

## Chapter 1 Abstract

### 1.1. Abstract

Cosmo Oil Co., Ltd. (currently called Cosmo Energy Group, hereinafter, “Cosmo”) started developing “ALA (5-Aminolevulinic Acid)” in the 1980s with the objective of diversifying its business. As for its use, in the end of the twentieth century, it was confirmed to improve production by “mixing with fertilizer” and official approval was given within the company to start a project as a “fertilizer business.” The first ALA-added liquid fertilizer was launched in the market in 2001 and this marked the start of releasing products into the Japanese agricultural market. However, the fertilizer business from a global perspective does not require liquid fertilizers, but solid fertilizers to enable cheaper and more efficient fertilization and Cosmo had to wait until 2010 to succeed in developing a solid fertilizer.

In 2014, expansion of the fertilizer business was discussed within Cosmo (Cosmo ALA Co., Ltd. at that time, an in-house venture business specifically for the ALA business program, hereinafter, “Cosmo ALA”). The conclusion was that it would be best to approach the Office chérifien des phosphates (hereinafter, “OCP”) in the Kingdom of Morocco, which is a major player in the global supply for fertilizer, and to have them certify the usefulness of ALA to popularize ALA fertilizer throughout the world. After contacting OCP, OCP indicated strong interest in the possibilities of ALA-added fertilizer, and fertilization experiments using the newly developed solid fertilizer for agriculture was started within Morocco.

This program involves ALA-added fertilization experiments and dissemination activities in collaboration with OCP to aim for improvement of agricultural productivity in Morocco using ALA-added fertilizer and high-value addition of agricultural products by improved quality, and production of ALA-added fertilizer in Morocco and production and full-scale exporting of high-value addition ALA fertilizer as an alternative to conventional exporting of phosphate rock to aim for improving the GDP of Morocco.

This program needs to confirm the usefulness of ALA when mixed in fertilizer. It is widely known that ALA is a precursor for chlorophyll and an important amino acid within plants, but the active action of ALA on plants was first reported in 1983 with the discovery that it has an effect in improving nitrate reductase activity in corn leaves. In the 1990s, various effects such as promoting photosynthesis and improving salt tolerance were reported, and in 2001, it was recognized in Japan (= Cosmo product) for the first time in the world as a promoter for increasing the effect of liquid fertilizers. Subsequently, with the progress of research in plant physiology, it was suggested in Japanese and international academic papers that ALA opens the stomata and promotes the absorption of fertilizer components, leading to further significance for mixing ALA into fertilizer. In 2015, Cosmo ALA overcame the technical problems preventing full-scale mixture of ALA into solid fertilizer and developed an ALA-added solid fertilizer and decided to validate and confirm its practical functionality through this program.

The objective of this program is to show OCP the usefulness of ALA fertilizer proven through fertilization experiments using various crops, and obtain recognition that would lead to “ALA-added fertilizer technology” being adopted by OCP and contributing to Morocco’s economical foundation. Furthermore, it is desirable for OCP and Cosmo to establish a contractual relationship and develop the business as a supplier of ALA technology for the agricultural industry and ALA as a fertilizer ingredient. Therefore, the implementation content of this program was a comparative experiment with conventional fertilizer using multiple crops and land within Morocco and Japan. This means validation of the effect of ALA-added fertilizer in ordinary fields under strict management of conditions, not inside a research laboratory.

As a result of this program, the usefulness of ALA-added fertilizer was generally apparent and led to obtaining specific points to consider when using ALA depending upon the crop. At the current time, it is assumed that OCP is continuing its discussions for a positive conclusion, and the current question is how OCP will assess the usefulness of ALA and decide whether ALA is appropriate for adding value to the functionality of fertilizer that OCP intends to produce and export from their main export, phosphate rock. Cosmo considers future business prospects as promising and continues to request a positive decision from OCP. Throughout the past few meetings, OCP has made many positive comments regarding the usefulness of ALA and does not question the content of the results of the fertilization experiments. In addition, there is a general societal trend in the global fertilizer market towards

improving food productivity with “Value Adding Fertilizer.” The fertilization experiments conducted during the past two years have confirmed that ALA-added fertilizer can increase production to 110 to 113% depending on the crop and usage. It is highly likely that OCP will adopt this as one of its effective tools to take the initiative in the global fertilizer market.

**The Kingdom of Morocco  
Program for Disseminating ALA (5-Aminolevulinic Acid) in Fertilizer  
Cosmo Trade & Service Co., Ltd.**

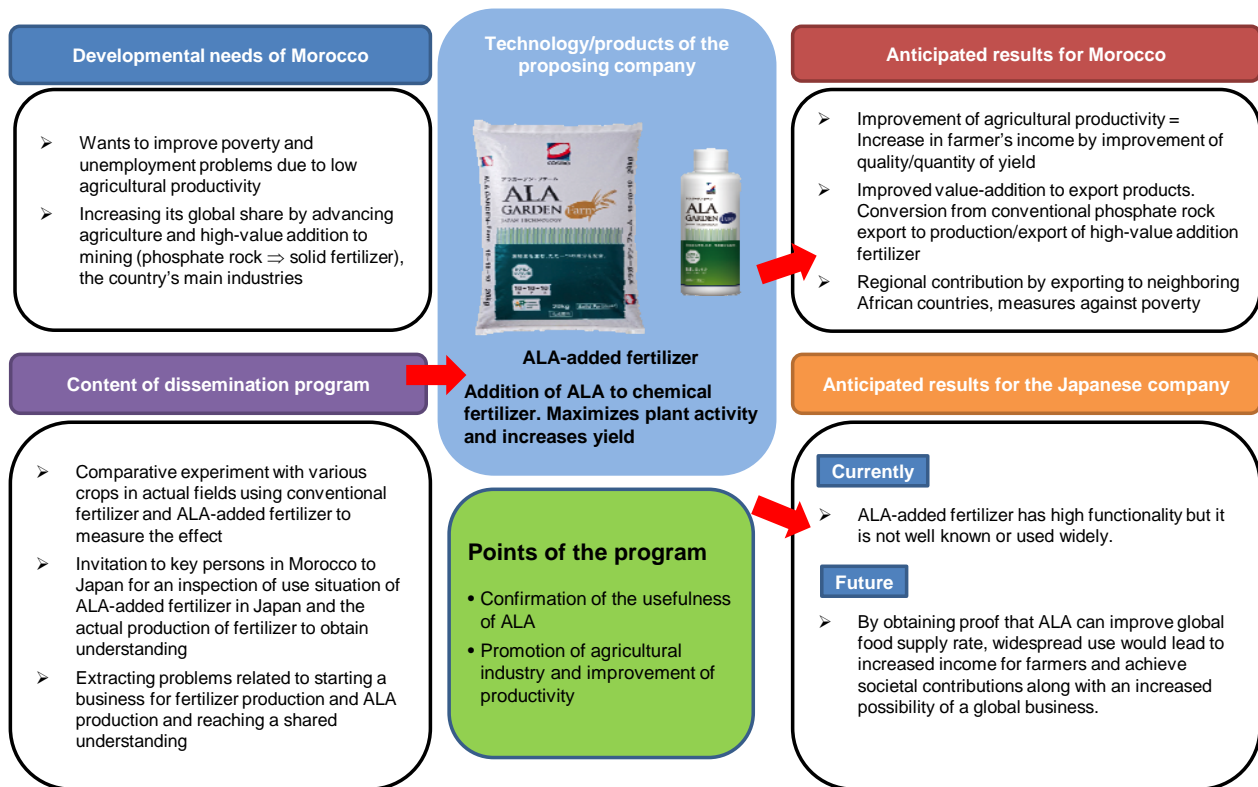


Figure 2: Summary of the Program

## Chapter 2 Background of This Project

### 2.1. Background of this project

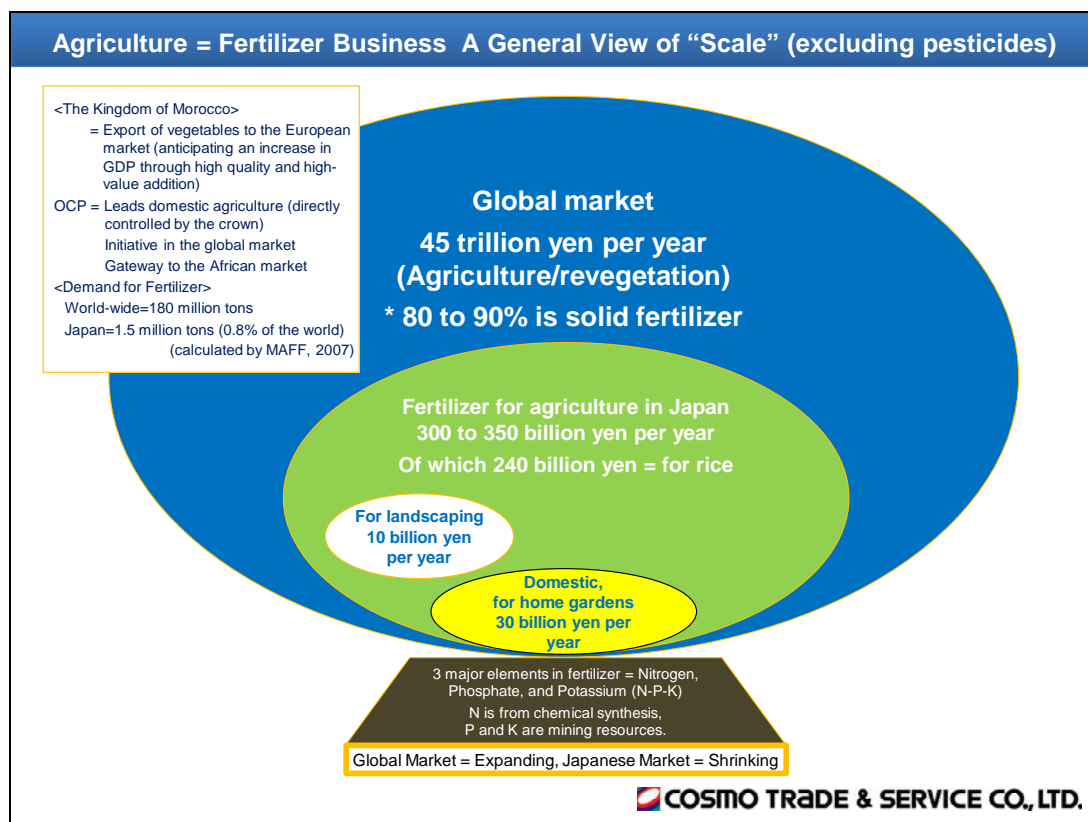


Figure 3: Scale of Agriculture Business

In 2014, expansion of the fertilizer business was discussed within Cosmo (Cosmo ALA at that time, an in-house venture business specifically for the ALA business program. In June 2016, the fertilizer project division branched out and became independent from Cosmo ALA and became a division of Cosmo Trade & Service Co., Ltd. (hereinafter, "Cosmo T&S"). The conclusion was that it would be best to approach OCP (Office chérifien des phosphates) in the Kingdom of Morocco, which is a major player in the global supply for fertilizer, and to have them certify the usefulness of ALA to popularize ALA fertilizer throughout the world.

The Kingdom of Morocco is a moderate constitutional monarchy and is an Islamic state that has achieved a certain degree of separation between government and religion. Since the so-called "Arab Spring" in North Africa, it has highly prioritized maintaining the nation and improving public security, and the focal points of policy are "eradicating poverty," "measures for unemployment and employment," and "education." A surplus in national finance through economic growth is imperative and in addition to conventional main industries (tourism, agriculture, and mining), the country is focusing on automobile production by "inviting factories to the free zone," utilizing its high literacy rate and hard-working nature of its citizens.

Cosmo has focused on OCP because it is a natural resource development company that is directly under the crown and exists as a higher organization than ministerial bureaus, and earns approximately a third of the country's GDP. Among the three main elements for fertilizer, nitrogen, phosphate, and potassium, it is said that 70% of phosphate rock resources are within Morocco and the country is one of the giants in the global fertilizer industry. OCP can control the fertilizer market along with various fertilizer businesses in Europe and the U.S. and its strength and influence is unmeasurable because not only does it contribute to improving domestic agricultural production but also has superior global marketing ability for fertilizers. In 2015, we succeeded in getting a direct appointment with

OCP's management and this started the fertilization experiments to confirm the functionality of ALA-added fertilizer in Morocco.

In this situation, this program involves ALA-added fertilization experiments and dissemination activities in collaboration with OCP to aim for improvement of agricultural productivity in Morocco using ALA-added fertilizer and high-value addition of agricultural products by improved quality, and production of ALA-added fertilizer in Morocco and production and full-scale exporting of high-value addition ALA fertilizer as an alternative to conventional exporting of phosphate rock to aim for improving the GDP of Morocco.

## **2.2. Target technology for dissemination and possibility of contributing to developmental aims**

### **2.2.1. Details of technology that is the target for dissemination**

The summary of the program in 1.2. shows the external appearance of the fertilizer product with ALA.

Cosmo T&S's fertilizer with added ALA is largely classified into liquid fertilizer and solid fertilizer. The fertilizer product used in this program is the liquid fertilizer "Turf" (right in Figure 2 Summary of the Program, Registration No.: No. 86058) and solid fertilizer "Farm" (left in Figure 2, Registration No.: No. 101227) in the ALA GARDEN series that is registered as fertilizer in Japan.

"Turf" is 9.5% nitrogen (N), 1.3% potassium (K), and includes minor elements such as iron (Fe), magnesium (Mg), manganese (Mn), boron (B), zinc (Zn), copper(Cu), molybdenum (Mo) and is normally diluted 2,000- to 10,000-fold and used by spraying on the stalk and leaves or irrigation to the soil.

"Farm" is a solid fertilizer that contains 10% each of N, P, and K, and it is designed as a fertilizer product to be used at 5 to 100 kg of this fertilizer per 10 a of land depending upon the NPK demand of the crop.

The main characteristic is that both contain ALA and ALA increases utilization of fertilizer components (NPK) and minute elements by the plant (promoter) and as a result increases photosynthesis, production level, anti-stress ability (low temperature, salt concentration, low light, etc.), and improved metabolism is anticipated. Its effect has been made apparent in many academic papers since the discovery of the effect of ALA in improving the activity of corn nitrate reductase in 1983. It is apparent from its performance since 2001, when it was registered as a liquid fertilizer in Japan, but ALA is fairly expensive as a fertilizer component and development of more economical techniques for usage such as timing and amount of fertilizer is necessary.

As an effect of ALA-added fertilizer, there was a maximum of 31% increase in yield with wheat in Japan as part of the experiments conducted in this program. In this case, 6 kg (3,000 yen) of "Farm" was added as additional fertilizer to 10 a and an increased yield of 100 kg wheat (Chikugoizumi) was obtained. The wholesale rate for domestic wheat by production region and brand for 2017 (Ministry of Agriculture, Forestry and Fisheries, March 2017 "Situation around wheat") was 44,319 yen/t for Chikugoizumi grown in Kyushu and even though there is an economical benefit with the current retail price for "Farm," it is necessary to aim for improved cost performance by reducing the price of fertilizer through widespread use of ALA fertilizer.

ALA is a type of natural amino acid that is synthesized *in vivo* by all living organisms and its safety is very high. As mentioned above, ALA-added fertilizer has been registered in Japan and there should be no problems in the safety of the technology since it has a long-term performance record. As mentioned above, ALA increases the effect of fertilizer and it is anticipated to have an effect on reducing fertilizer use. The burden on rivers caused by washed away fertilizer has become an environmental problem and this fertilizer also has an aspect of being an environmentally-friendly product. Although some conventional amino acids have been approved in Japan as being advertised as substances that promote the effect of fertilizer components, there are none that have a clear effect as ALA does in opening stomata and improving nitrate reductase activity, making it very unusual even in the world. It is considered that there would be no competing technology in the target country.

### **2.2.2. Possibility of contributing developmental aims**

When usefulness of ALA-added fertilizer, technology that our program would like to disseminate, becomes apparent, it may contribute the following two broad contributions to the target country.

(1) Improvement of agricultural productivity: Field trials in Japan were conducted and a variety of crops were tested in fertilization experiments, and an increase in yield of about 5 to 30% was observed. In the target country, even a modest prediction would be the possibility of increasing farmer's income by 5 to 10%.

(2) Improvement of value-addition to export products: The target country exports phosphate as a fertilizer ingredient to the world, but most is still in the form of phosphate rock and the ratio of exported value-added fertilizer is low. The main reason is that when a primary product is produced as an ingredient, taking the petroleum industry as an example, it is difficult to realize high-value addition in the country of production because of the power relationship due to industrialization in the country with demand and the low price for exporting. Full-scale introduction of ALA may act as a so-called game changer to change this power balance and may lead to the possibility of fertilizer production in the country, addition of ALA to export as a high-value added fertilizer instead of phosphate rock, or collaborations with partner companies in exporting to have production of high quality fertilizer containing ALA under OCP's name at that country to propose to their market. Profitability should be calculated by future contract conditions, investment in facilities to add ALA, and other accompanying conditions, but in any form, an increase in the mid- to long-term export value as an export country of phosphate for fertilizer is anticipated.



## **Chapter 3 Summary of the Program**

### **3.1. Objective and aims of the program**

#### **3.1.1. Objective of the program**

The objective of this program is to prove the usefulness of ALA-added fertilizer through fertilization experiments with various crops and to contribute to the financial foundation of Morocco through OCP's adoption of "ALA addition to fertilizer technology." Furthermore, it is desirable that under contract with Cosmo, this develops into an exclusive business project to supply ALA as a fertilizer ingredient and ALA technology to the agricultural field. Therefore, a comparison with normal fertilizer will be conducted with various crops and fields in Morocco and Japan. On-site validation of the effect of ALA-added fertilizer will be managed under strict conditions in normal fields.

#### **3.1.2. Aims to achieve with the program (contribution to developmental problems in the target country, region, and city)**

This program needs to confirm the usefulness of ALA when added to fertilizer. It is widely known that ALA is a precursor for chlorophyll and an important amino acid within plants, but the active action of ALA on plants was first reported in 1983 with the discovery that it has an effect in improving nitrate reductase activity in corn leaves. In the 1990s, various effects such as promoting photosynthesis and improving salt tolerance were reported, and in 2001, it was recognized in Japan (= Cosmo product) for the first time in the world as a promoter for increasing the effect of liquid fertilizers. Subsequently, with the progress of research in plant physiology, it was suggested in Japanese and international academic papers that ALA opens the stomata and promotes the absorption of fertilizer components, leading to further significance for mixing ALA into fertilizer. In 2015, Cosmo ALA overcame the technical problems preventing full-scale mixture of ALA into solid fertilizer and developed an ALA-added solid fertilizer and decided to validate and confirm its practical functionality through this program.

If the usefulness of ALA-added fertilizer is recognized and ALA is adopted as one of the ingredients for fertilizers by OCP, the agricultural productivity and the quality of agricultural products of Morocco will improve by high-value addition, and an increase in the simple income of Moroccan farmers can be anticipated. Production of ALA-added fertilizer in Morocco and production and full-scale exporting of high-value addition ALA fertilizer as an alternative to conventional exporting of phosphate rock will contribute to improving the GDP of Morocco.

#### **3.1.3. Aims to achieve with the program (business)**

Once OCP decides to "adopt" ALA-added fertilizer, the aims to achieve with the program are to ensure a wide range of buyers for ALA-added fertilizer and to newly establish a system for marketing strategy. After adoption is decided based on the results of several field tests, firstly, investment on facilities for adding ALA to one of the lines in OCP's fertilizer production plants would be assumed, and at that stage, sales of ALA is expected to rise. For actual ALA sales, discussions will focus on further developing the business through a "mutual technical cooperation contract" assuming the transfer of know-how regarding ALA addition to fertilizer before a sales contract and eventually in the future, agreement to "establishment of a local subsidiary through a joint venture."

### **3.2. Implementation content of the program**

#### **3.2.1. Implementation schedule**

The mainstay of the program is to "prove the functionality of ALA-added fertilizer," in other words, fertilization experiments in actual fields. For this purpose, a "free sample" paid by Cosmo is exported and OCP pays for management and storage. Fees related to implementation of fertilization experiments are to be fully paid by OCP.

The fertilization experiment plan in Morocco is to be decided by OCP and it has been agreed that OCP will be fully responsible for crops, timing, field size, and management and operational tasks. Since the experiment is to be in the field, it may take two years since one cycle takes one year and depending upon the results, another cycle may be required for validation experiments. However, there is a possibility that evaluation may not be possible within the program period. In addition, inspection of usage of ALA-added fertilizer and increased yield at farms in Japan and also inspection of the production factory of ALA-added fertilizer will be part of the invited visit to Japan.

#	Program content	Schedule			Implementation content	Aim (Situation at end of program)
		2015	2016	2017		
1	Provision of sample	Oct			Free provision of solid fertilizer of approximately 11 tons	Confirmation of usefulness of ALA-added fertilizer
2	Primary field trial (Morocco)	Nov			Start of fertilization experiment (various crops) at four areas and 30 fields in Morocco under OCP budget	Same as above
3	Sharing of primary field trial results		Sept		Sharing of results of fertilization experiment in Morocco	Same as above
4	Invitation to Japan			Mar	Inspection of usage of ALA-added fertilizer in Japan and inspection of production process	Confirmation of ALA-added fertilizer production process
5	Secondary field trial (Japan)		Dec		Fertilization experiment in Japan (low-value added crop = wheat, etc.)	Reconfirmation of ALA-added fertilizer
6	Sharing of secondary trial results			Jul	Sharing of results of fertilization experiment in Japan	Same as above
7	Agreement on price and confirmation of annual transaction count			Within the year	Cost structure = understanding regarding price and confirmation of long-term commitment	Decision on adoption of ALA-added fertilizer
8	Adoption			Within the year	Official agreement on adoption of ALA	Establish as a business project
9	Technology transfer/facility investment, etc.			Within the year		Start of business

Figure 4: Implementation Schedule

## Main frame of OCP/COSMO "Project-ALA-Trials"

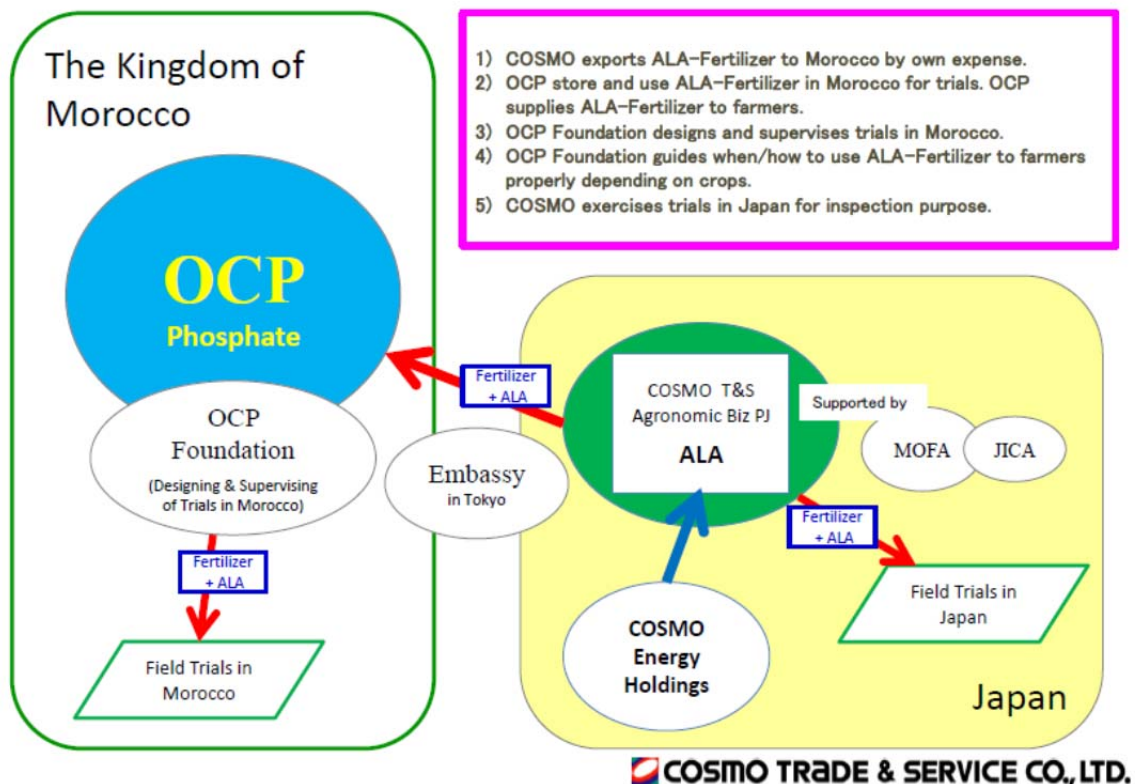


Figure 5: Organizational System for the Program

## Chapter 4 Activity Results for the Program

### 4.1. Results of fertilization experiment (strawberry) in a field in Morocco

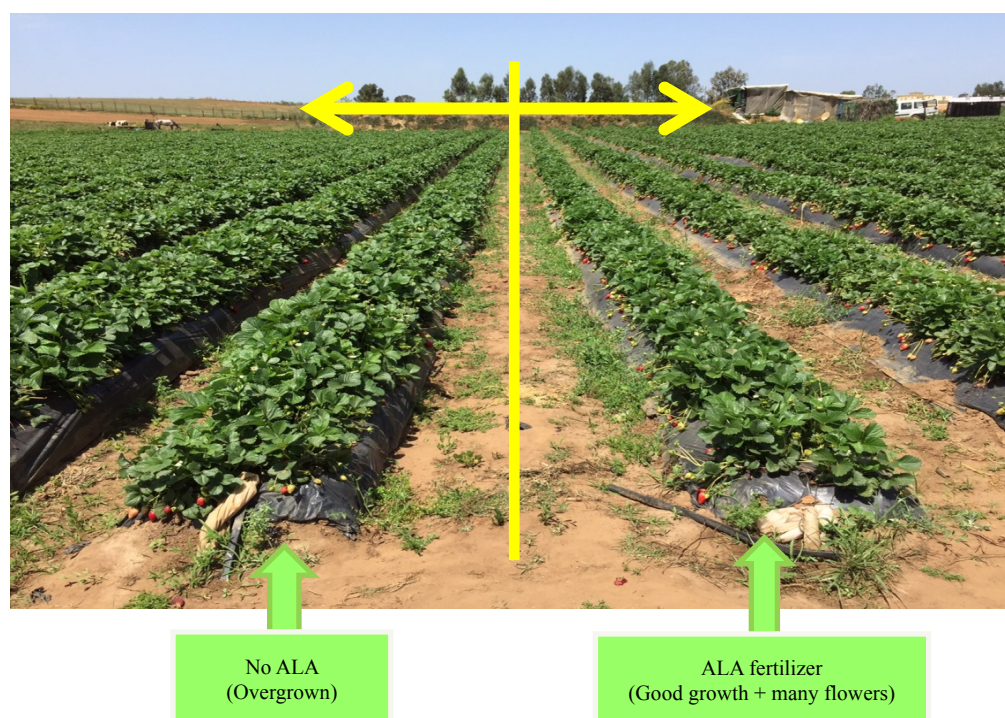


Figure 12: Comparison of Fertilization Experiment Using Strawberry (Photo 6)

\* The size of plants seemed clearly more compact in the rows with ALA-added fertilizer compared to rows without ALA (the number of leaves was clearly higher in the rows without ALA). This situation seems to prove that compared to the normal “try to make as many leaves as possible = overgrown” state, the effect of ALA increased chlorophyll on leaves per unit area, which led to fewer leaves. The energy consumed for producing leaves was less, and instead, the roots became extensive and as a result, there were more sturdy flower buds because more nutrients and water was delivered, leading to more fruit. Walking along comparing the rows, it was apparent that there were more fruit in the rows with ALA.

Comments from the farmers

- The plants with added ALA have bigger fruit and the stems are thicker. Each individual plant seems stronger.
- The plants with added ALA have less leaves and are more compact in general.
- The plants with added ALA compared to no ALA continue to have fruit → there would be a difference in total yield.
- Wholesaler visited the field and pointed at the “rows with added ALA” and said they “wanted the fruit from those rows.”

### 4.2. Fertilization experiment in fields in Japan (wheat, etc.)

Among the experiments conducted in Morocco from 2015 to 2016, the results for wheat, which were of interest to OCP, was an increase of 103–105% and did not reach the anticipated level by OCP. Therefore, we reported the results of additional experiments with wheat in Kyushu (four areas) and barley in Toyama (one area) conducted from the beginning of 2017.

- The conclusion of this presentation by Cosmo T&S indicated data for results on wheat and barley as a matrix relating to the improvement of water utilization efficiency by ALA, and there was a clear correlation with that effect and other environmental factors. This is a focal point that has appeared in recent academic research papers in countries such as China and is reasonable considering the discovery of stomata opening/closure regulation by ALA and ABA by Professor Mori (The University of Tokyo) in 2004 and ALA action (salt tolerance) that has been observed by Cosmo T&S. This data for wheat and barley was summarized from the point of “improvement of water utilization efficiency by ALA; the effect of ALA becomes more apparent under stressful environment” and we asked for OCP’s understanding (refer to below figure).

Soil conditions	ALA application timing		Expected value of ALA effect	Image of standard yield	Trial in Morocco in 2015-2016
	Basal dressing	Top dressing			
Excess water	+ALA	No ALA	++	300~400 Kg/10a	Typical Japanese conditions
	No ALA	+ALA	++++		
Enough water	+ALA	No ALA	+	500~700 Kg/10a	Typical Moroccan conditions
	No ALA	+ALA	+++		
Less water	+ALA	No ALA	+	100~300 Kg/10a	Typical African conditions

+ = 100-105% up, ++ = 105-115%, +++ = 115-125%, ++++ = 125%<

Figure 13: Possibility of Effect by ALA from Water Content in the Soil

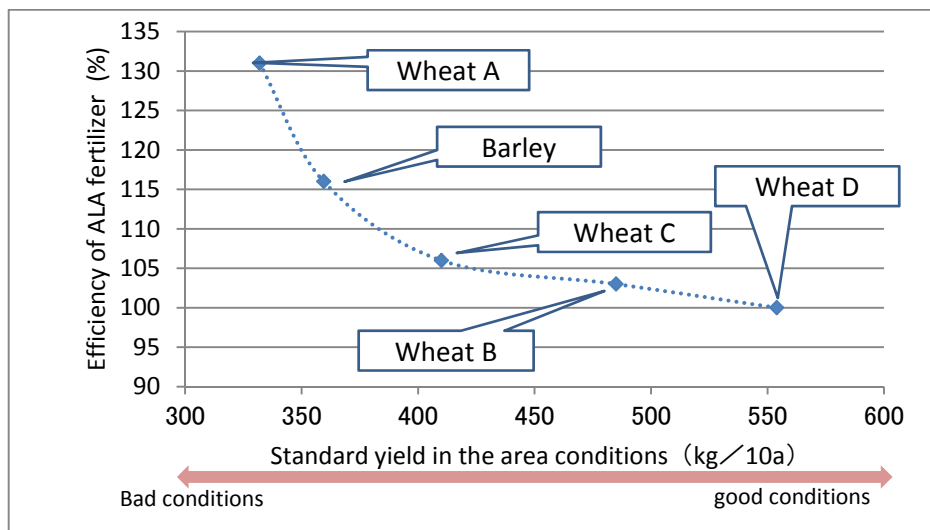


Figure 14: Matrix of Fertilization Experiment Results for Wheat (Gramineae)

Summary of experimental results = Use in good conditions/advanced farmers show improvement but the difference is small.

Use in bad conditions/ordinary farmers are more likely to see large improvement in yield.

## Chapter 5 Summary of the Program (Assessment Regarding the Implementation Results)

### 5.1. Results of this program (contribution to target country, region, and city)

During this program, two cycles of fertilization experiments were completed during the period. Normally, fertilization experiments for agricultural crops take three cycles (three years) to confirm results because weather and other conditions change each year, and we assumed that we may not necessarily achieve results during the program period. However, a variety of academic papers have been published in Japan and overseas regarding the action of ALA within fertilizer and OCP had also simultaneously proceeded with their literature research, and together with the effort into interviews and communication throughout this program, along with the fertilization experiment, has generally led to a positive assessment regarding the possibility of ALA-added fertilizer.

### 5.2. Results of this program (business side) and strategy for solving the remaining problems

#	Task	Activity plan and results					Status of achievement	Strategy for solving the remaining problems	Action and timing for solving problems
		2015 1st half	2015 2nd half	2016 1st half	2016 2nd half	2017 1st half			
1	Confirmation of marketability and local needs	→	→	→	→	→	Completed	General understanding that ALA-added fertilizer acts on crops and has a positive effect.	
2	Understanding of OCP regarding ALA fertilizer technology	→	→	→	→	→	Completed	Same as above. Interest has shifted to costs for setting up and application for fertilizer registration in African countries.	Further discussion is required on what type of cooperative system could be agreed upon.
3	Signing of contract for OCP adopting ALA for its fertilizer and contract for long-term supply of ALA to OCP					Not yet	Remaining problem	Adoption of ALA has not yet been decided and also no agreement yet regarding supply. Requesting the establishment of long-term and inter-beneficial relationship, and no response although basic understanding has been reached.	Decide on adoption of ALA at an early stage and sign a contract for long-term supply.
4	Signing of technical collaboration contract with OCP					Not yet	Remaining	Same as above. Specific technical interactions will start after agreement.	Contract is essential for detailed technology transfer of ALA addition to fertilize.
5	ALA addition at fertilizer production process = Decision on investment on local factory					Not yet	Remaining	Cooperation in planning a reasonable investment plan starting with understanding how ALA addition facility is going to be added to the fertilizer production process.	Other than investment in facilities, time will be required for operators to become established in technical skills

Figure 15: Results of this program and future expectations for the business

### **5.2.1. Results of the program (business side)**

As mentioned above, the major objective of the program is to confirm the usefulness of ALA in fertilizer, in other words, conducting a comparative validation by fertilization experiments in actual agricultural sites and achieve “adoption of ALA for their fertilizer.” During the contract period, although two cycles of validation were completed, a decision for adoption was not achieved. The decision for starting up a business which is initiated with adoption is to be implemented through taking into general account, the results of the fertilization experiments, understanding the numerous academic papers being published in Japan and overseas, and also the competitiveness of the price of ALA-added fertilizer after including ALA production and supply costs, which is at the current time not yet determined. However, from the various data, it is considered that OCP has a generally favorable impression of the effect of ALA itself when added to fertilizer and in the two years that was predetermined for this program, considering the unique underlying issues related to agriculture requiring a long time span for investigations, we evaluate this program as having achieved a certain level of results.

## **Chapter 6 Plan for Business Development after the Program**

### **6.1. Business objective and aim**

#### **6.1.1. Results anticipated through business (contribution to social and economic development of target country, region, and city)**

Firstly, considering the supply of ALA -added fertilizer, transport of fertilizer produced by Cosmo in Japan would be too inefficient, and local production should be considered. ALA itself can be transported from Japan, but regarding selling/buying of ALA in Morocco, it is necessary to consider whether (1) it will be a simple export, (2) world-wide procurement is considered, or (3) sales of ALA as an ingredient will be through a local subsidiary established by Cosmo alone or as a joint venture. In addition, it is necessary to invest in ALA addition facilities at OCP's fertilizer factory, and it is necessary to establish a system for technology transfer of ALA addition to fertilizer and continuously implement technical cooperation regarding product quality control.

By establishing such a business environment, Morocco's GDP would increase if a certain level of OCP's export shifts from its mainstay of phosphate rock to fertilizer products, since added value will rise together with the selling price. In addition, improvement in agricultural productivity (not only quantity, but also quality) by using ALA-added fertilizer can be anticipated and it may lead to an increase in income per farmer. Furthermore, if promotion of introduction to neighboring African countries suffering from agricultural productivity problems can be implemented, it may help in the movement to eradicate poverty among these countries.

### **6.2. Business development plan**

#### **6.2.1. Summary of the business**

If OCP adopts ALA, the following business projects can be considered.

- 1) Introduction of ALA-added fertilizer to farming within Morocco
- 2) Export of ALA-added fertilizer to neighboring African countries from Morocco

Cosmo will contribute to the actualization of the above business as a partner that exports ALA to Morocco and gives continuous technical support.



## Possible future image of "Project-ALA-Business"

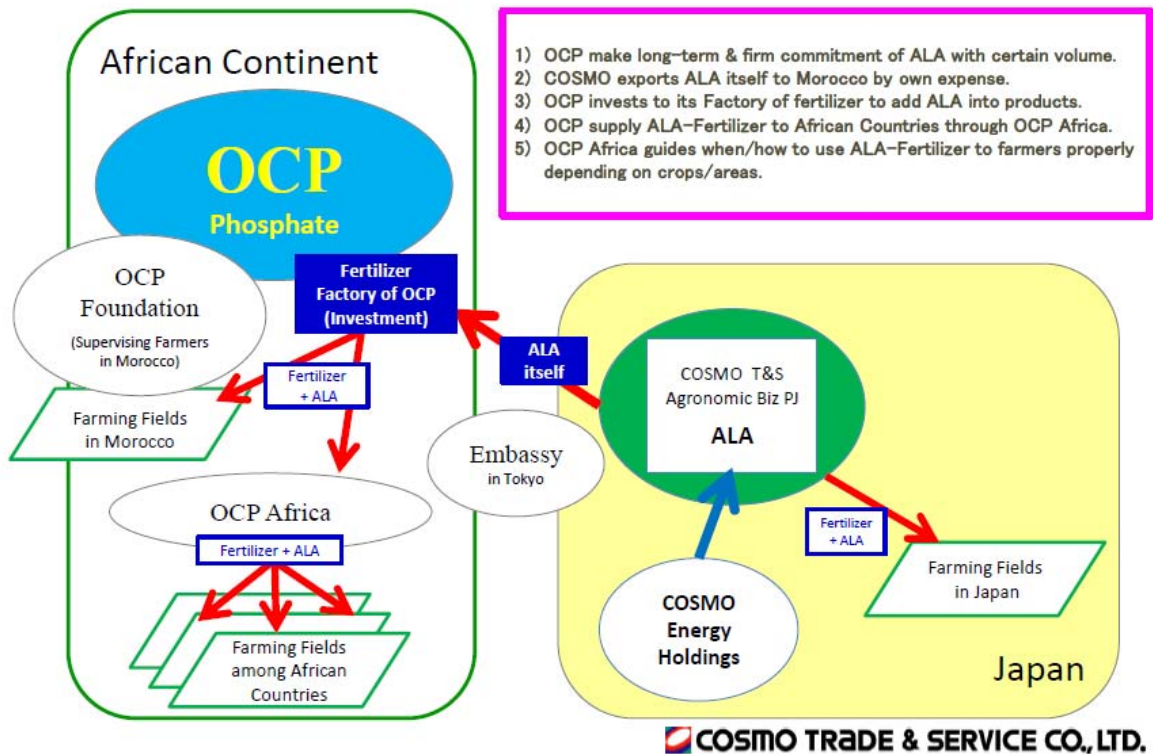


Figure 16: Future Image of the Business

### 6.2.2. Situation of competition

At this time, no competing technology to mix ALA into fertilizer exists in the target country. However, ALA is a widely available substance for procurement and the possibility of competition in supplying of ingredients is not ruled out.

### 6.2.3. Strategies to solve problems related to developing the business

Regarding procurement of ALA itself, rather than invest in enhancing or newly building production facilities for their own product in order to supply the amount that the Moroccan side would like, it would be desirable to consider worldwide procurement. We are positive in evaluating that worldwide procurement of ALA would be a quicker path to actualize this business because it would not be difficult to stably and cheaply procure ALA above a certain quality level.

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