codex alimentarius commission

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

WORLD HEALTH ORGANIZATION

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AGENDA ITEM NO. 4B **CX/FL 05/33/5-ADD.2**

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JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FOOD LABELLING
THIRTY-THIRD SESSION
KOTA KINABALU, MALAYSIA, MAY 9 – 13, 2005

PROPOSED DRAFT AMENDMENT TO THE GUIDELINES FOR THE PRODUCTION, PROCESSING, LABELLING AND MARKETING OF ORGANICALLY PRODUCED FOODS:
PROPOSED DRAFT REVISED ANNEX 2 - TABLE 1
(NATURAL SODIUM NITRATE)
(ALINORM 04/27/22, APPENDIX VIII & CL 2004/22-FL)

GOVERNMENT COMMENTS AT STEP 3

COMMENTS FROM:

CHILE

PROPOSED DRAFT AMENDMENT TO THE GUIDELINES FOR THE PRODUCTION, PROCESSING, LABELLING AND MARKETING OF ORGANICALLY PRODUCED FOODS:
PROPOSED DRAFT REVISED ANNEX 2 – TABLE I
(NATURAL SODIUM NITRATE)
(ALINORM 04/22, APPENDIX VIII & CL 2004/22-FL)

GOVERNMENT COMMENTS AT STEP 3

CHILE:

Chile is grateful that a dialogue has at last been allowed to start about this important issue, important because it will ultimately prove the credibility, not only of the evaluating process but of organic farming itself.

Chile is firmly convinced that the complementary use of natural sodium nitrate will be an important contribution to the success of organic farming nationally and worldwide.

Yet Chile is surprised that despite all its efforts, the same questionable counter arguments are unfairly presented over and again.

Indeed, several in depth replies on IFOAM's two evaluations of the product (1989 and 2004), supported by extensive scientific background material such as the book "Natural Nitrogen Nitrogenous Rock" (NNNR, 150 pages), have been provided. All those documents are supported by more than 200 references (2/5 organic and 3/5 conventional) from worldwide recognized organic and conventional scientific authorities and NOSB TAP reviews. Furthermore, Chile believes that data both from organic and conventional research environments have more weight than data almost exclusively based on one farming system, as in IFOAM's case.

Several distinguished experts from Universities in Belgium, The Netherlands, Chile, South Africa, South Korea, USA and Switzerland have independently reviewed the book. Those reviews are available on request and further independent reviews are most welcome. All documents were drafted strictly according to the CODEX or IFOAM formats designed to evaluate substances for inclusion as organic input materials.

Chile takes note that IFOAM recognizes that their 1989 evaluation of the substance was at least partially "*inaccurate*" and "*dated*", and Chile has learned that the consequent rejection of Natural Sodium Nitrate (NSN) was actually based on this document and it is not aware of any other evaluations up to the 2004 evaluation. Chile understands that it is difficult to come back on a prior decision, but would regret that the original decision would be based on partly flawed data and not be adjusted accordingly, which would by itself contradict the so important IFOAM Principles of Fairness, Justice and Prudence and consequently would prejudice the credibility of organic farming.

Further Chile regrets that the latest comments of IFOAM in CX/FL 05/33/5 under ALINORM 04/27/22, APPENDIX VIII & CL 2004/22-FL are again mostly

unsubstantiated and "value judgment" based which is most unusable in a scientific environment to say the least. Nevertheless Chile offers the following succinct comments on their different sections:

"Inaccurate comparisons"

First and foremost Chile protests against value based assertions like "*Many of the comments are based upon erroneous analogies, false or unsupported premises*." If this were the case they should have been substantiated. Even though Chile arguably is much "*familiar with the subject*" it has not been able *"to recognize them* (i.e. those so called *"erroneous analogies, false or unsupported premises")"* and further Chile does not accept that in its argumentation *"apples are compared with oranges*":

Indeed

(1) Nitrogen (N) is not compared with sulfur (S) but the N-**cycle** with the S-**cycle**. It is a general accepted scientific fact that sulfate and nitrate cycles are very similar and indeed can be compared very well with each other ***(1).*** Also the **solubility** of nitrate is compared with the **solubility** of sulfate. Solubility i.e. plant availability, is an important property and an important advantage in the context of its intended use i.e. in particular conditions where the nitrate supply from other N-sources is not synchronized with the N-needs. It is therefore doubly incomprehensible why the solubility of sulfate, as high as the one of nitrate, would be seen as a positive characteristic whereas for nitrate which on top is less easily leached, it would be considered a negative. Also Chile expresses its additional surprise that synthetic S from petroleum **origin** is allowed in some countries (e.g. OMRI list) where N from the most natural nitrate is not.

(2) The Nitrogen was not compared with the Phosphorus but their **mining** methods and therefore their environmental impact.

(3) Nitrogen was not compared with Potassium but its ore **beneficiation**, which in the case of authorized Potassium sulfate, is through ion exchange and therefore results in a less natural product than NSN, which has been concentrated by solar evaporation only.

"Fertility, yield, and quality "

The Chilean Delegation never even suggested that "*maximum yields*" where the goal of organic agriculture and always referred to "optimal yield". What Chile meant is that it is a fact that yields are sometimes sub-optimal in terms of quality and quantity ***(2, 3, and 4).***

That this is, according to IFOAM," *simply and eloquently refuted by the empirical presence of abundant, high quality organic food grown without CSN*" unfortunately does not, in Chile's opinion, reflect reality for some crops under certain conditions which is abundantly documented. And why else would then soluble and more or less mineralized commercial fertilizers like feather, leather, blood, meat or fish meal be authorized and used in most countries as quick acting nitrate source?

Chile does not understand the reasoning behind non substantiated expressions like "*two steps backwards*". Indeed why the complementary use of NSN would "*neglect the need of good rotation with soil building and the integration of animal and plant production in farming systems"?*

"Whole systems approach"

Chile recognizes and encourages the holistic approach of organic agriculture however it does not understand how NSN and its complementary use can be evaluated by comparing the 2 farming systems i.e. organic with conventional. Indeed the different use of fertilizers is only one of the many variables as are pesticide use, rotations, plant varieties etc. Chile recognizes the strengths and weaknesses in both farming systems and suggests that the point should not be to compare the 2 farming systems themselves but only the effect of the use of **NSN** in both and then only as complementary use. This approach would then eliminate this latest source of confounding variables.

The real reason that NSN "*is seldom used in conventional production"* is because of its higher price since the natural extraction is a more expensive process than chemical synthesis. It is unfair to state that the reason would be the sodium content as this has been rebutted in all referred to documents. It would be just as unfair to pretend that sulfate should not be used in organic agriculture because it is plant stunting ***(5)***. This would only happen at high rates, which is NOT its intended use and which again is NOT the intended use for NSN either.

The Chilean Delegation recognizes that of course "*the huge losses from organic manure are mainly a result of the separation of arable and beef/milk production, resulting in huge areas in Europe and America with overstocking. In organic farming in most cases arable and live stock systems are linked."*

But for this **very same reason** Chile does not understand why then IFOAM is:

1) comparing the complementary use of NSN under certain conditions with the conventional general use at high rates;
2) identifying the nitrate controversy with nitrate fertilizers.

To clear up once and for all this apparent misunderstanding it may be worth to state once more the **generally accepted scientific facts** (points 1-8 and 10 of following list) about nitrate as plant nutrient:

1) N (nitrogen) is the most important plant nutrient (after water, CO_2 and O_2).
2) N is for over 90% taken up by all plants as nitrate in conventional as well as in organic agriculture.
3) N-fertilizers are mineral or organic. (Organic in this sense means compounds that contain C.)
4) Plants practically do not take up any organic N compounds.
5) To be plant available (almost) all N in those fertilizers has to be converted in nitrate if not already in that form. (The remainder in ammonia).
6) Pollution of groundwater (or well water) with nitrates and excess of nitrate in crops is due to excess use of N-fertilizers (mineral or organic) or synchronization problems.
7) For the same amount of N-input, leaching losses (as nitrate) and other N losses such as ammonia losses) are mostly much higher from organic N-sources than from mineral N-sources.
8) The higher nitrate losses are mostly due to synchronization problems i.e. a time gap between plant nitrate needs and nitrate availability.

9) The intended use of NSN is not to replace nitrate from organic sources but to complement it in order to compensate this lack of synchronization present in certain circumstances.
10) This complementary use is one of the BMPs (Best Management Practices) to diminish nitrate pollution and at the same time will increase crop yield and quality.

Also Chile does not understand what is meant by "*careful using treated liquid manure*", but knows that it is a fact that this practice is prohibited in most countries for application less than 120 days before harvest for hygienic reasons and therefore excludes its use in certain vegetables crops. This is one of the reasons why animal waste products (feather meal, fish meal, meat meal, bone meal, leather meal etc. are used instead. (More about these at the end of this paper). Moreover they contain also P and K, and therefore don't target specifically the needed N-demand. Consequently they can cause accumulation of these other elements (M. Lichtenhahn; FiBL course for farmers; January 2005 : "*Have* [existing] *competing commercial organic fertilizers a future in relation to farm organic fertilizers in field crops*".).

"Long-term trials"
Chile agrees that "*combined fertilization with mineral and organic nitrogen fertilizers increases soil organic matter (SOM) even more"*. This clearly indicates the synergetic effects of complementary use and NOT substitutional use, which has been **exactly the point** that Chile wants to make all along. Chile of course recommends healthy inputs of organic matter. It only wants to say that organic matter alone in certain conditions is not an efficient enough N provider as it sometimes releases its nitrate out of synchronization with plant needs. On the other hand it has not seen any proof (neither through long term nor through short time trials, free of confounding variables) that organic (compost, manure) fertilization alone would increase SOM even more.

As for the so called misinterpretation of the DOK-trials: Chile merely transcribed the recent comments from the Agroscope FAL, Zurich Reckenholz, Swiss Federal Research Station for Agroecology and Agriculture (Switzerland), Polytechnic Institute of Zurich, as was referred to.
Regarding "…. *by appropriate variety choice, good quality can be achieved with very low complementary levels of soluble nitrogen input from organic*[-ally approved] *sources…"*, Chile is grateful that IFOAM indeed recognizes the complementary need of soluble nitrogen (mostly nitrate or nitrate-in -coming).

"Environmental impacts & Inconsistencies"
Regarding the discussion around non-renewable resources, Chile finds it unfortunate that IFOAM again does not use the organic holistic (system approach) concept in this case. First, most of current NSN comes from the Caliche wastes as byproduct of the extraction of iodine and other elements. This process is expected to continue in the foreseeable future. Therefore, if NSN would not be used in agriculture it would simply become a non recycled waste product. Second, early vegetables are frequently flown in from overseas or trucked over long distances, exactly because sometimes they could not be produced locally for lack of available N in the early season; the non renewable energy wasted that way is important and should be taken into account. Therefore Chile recommends that **total (holistic) balances of renewable resources are made instead.**

Chile finds it unfortunate that arguments like "*misuse*" and "*difficult to inspect*" are used when on the other hand

(1) all inputs are inspected in organic agriculture ;
(2) the origin of most inputs are difficult to inspect: inputs such as copper sulfate, synthetic ammonia that could have been mixed with manure, potassium from many different sources, authorized or not, etc…

Chile beliefs more in positive attitudes and is convinced that the organic farmer deserves trust, and has engaged in organic agriculture because he beliefs in it and therefore acts responsibly ***(6).*** Chile understands that this ethical aspect is also part of the holistic concept and that abuses cannot be avoided with regulations and enforcement alone but foremost with mutual trust, credibility and consistency in the principles and the rules.

That *"… CSN has a much higher potential to be leached out and to pollute surface and ground water than other mineral fertilizers used in organic farming…"* is as already mentioned before a fallacy and has been demonstrated as such over and again. Once again, reality is that in the critical growing conditions where the use of nitrate is intended, the organic amendments **cannot** always supply the necessary N **in synchronization** with the plant needs and **therefore** are a source of nitrate pollution.

"Food quality and safety, general perception"

The reply of IFOAM in CX/FL 05/33/5 under ALINORM 04/27/22, APPENDIX VIII & CL 2004/22-FL has its majority of authors from FIBL, Switzerland. Therefore, in order to be most efficient and convincing in this complex and controversial issue, references from the same FIBL Switzerland will be referred to. The difference is that this time these references come from FIBL people in the field and are meant for a farmer audience that has to cope with reality on the farm.

1) FIBL course for organic farmers in Switzerland, January 2005, by Mr. Martin Lichtenhahn: "*Do* [existing] *competing commercial organic fertilizers have a future in relation to on-farm organic fertilizers in field crops?*" (translated from German).

   Most of the commercial organic fertilizers commented were animal waste based fertilizers such as feather meal, fish meal and leather meal (meat meal and blood meal are already forbidden in Switzerland for disease contamination risks) (*):

Advantages of those commercial fertilizers that were mentioned (translated from German:

- *Low* [or according to Mr. Lichtenhahn, verbally: *"None"] Carbon per unit of Nitrogen (C/N rate).* Comment from Chile: therefore those materials are for all practical purposes to be considered as mineral soluble N-sources; consequently because of the intended use as quick N-release fertilizers this was considered an advantage in this context.
- *The most mobile nitrogen form for organic agriculture* (Comment from Chile: as above)

- *Granulated and concentrated material*.
- *Sensible recycling of organic wastes* (Comment: when making abstract of the health issue, see below)
- *Competitive in price*
- *Complementary use to on-farm fertilizers*
- *Particularly interesting for farms without livestock*

Disadvantages:

- *Origin of the raw materials can hide dangerous health risks* [Mr. Lichtenhahn added verbally *"brings in the recycling cycle something that we don't want"*]
- *The most mobile nitrogen form for organic agriculture* (Comment from Chile: depending on the intended use, see above)
- *Contradicts the ideals of organic agriculture* (comment from Chile: Reality may be slightly different from the ideal. However this does not mean that the integrity of the concept is compromised; on the contrary, it avoids a slide into self-indulgence and promotes openness and therefore corrective action instead of wrong-headedness.Chile would like to remind that organic rules are manmade.)
- *Image problems* [perception] *are possible*

  It is further mentioned in the same course that those fertilizers sometimes exceed with more than 100% the P requirements of the crop.

  (*) Most plant based N-fertilizers were considered too slow and inefficient and therefore were not recommended. Others were hydrolyzed and therefore should be considered synthetic and made through an energy wasteful process.

2) From the FiBL (**) course for farmers on 14 July 2004 by Gabriela S. Wyss: "Erfahrungskurs Biogemüsebau" about "*What are the dangers from residues in vegetable cropping?":*

   "Several organic crops on several soils in Switzerland surpass the legally imposed maxima for PCB's up to 5 times and this even on farms that are certified organic since more than 15 years." Comment from Chile: It is a widely known fact that fishmeal, an approved organic fertilizer, is an important source of PCB's in food and humans (just consider the recent salmon controversy) and accumulates in the soil.

   (**) The same FiBL that recommended the substitution of meat meal with fish meal 2 years earlier because of health risks with meat meal.

3) From M. Koller's activity report FiBL 2002: *"90 to 95 % of the fertilizers used in Switzerland in the organic production of vegetables and ornamentals…are now feather, leader or fish meal."*
   Comment from Chile: these fertilizers have been introduced in Switzerland rather precipitously once the blood and meat meal had been forbidden due to BSE. Indeed, organic farmers in Switzerland cannot grow crops such as early vegetables without a reliable N-source. Unfortunately those fertilizers are either a health risk or underwent hydrolysis (and are therefore artificially solubilized).

4) What about the quote of Prof. Dr. Edelhäuser, food chemist at the Ministry for Nutrition and Rural Areas in Baden-Württemberg, a German federal state: "*This means that all products with any pesticide residue higher than 0.01 mg/kg are, by definition of the department, produced under fraudulent practices."*? (Beate Huber, Director FiBL Germany; The Organic Standard Grolink AB; IFOAM, Issue 24, April 2003)

5) From the Swiss Ministry of Agriculture (November 5, 2004) the following written information has been obtained: "*the Swiss confederation realizes the risk that wastes represent when used as fertilizer…. In particular we know that waste from animal origin represent certain health risks such as transmission of specific diseases*."

All in all, the use of animal wastes like feather-, fish-, leather meal, etc. which are the alternatives for NSN and which are broadly used in many countries do not at all respect the fundamental Precaution, Care and Health Principles of organic farming. Indeed, feather meal presents a risk for transmission of Avian flue, the next pandemic according to WHO ***(7),*** fish meal has high levels of PCBs and other POP's ***(8,9,10,11,12,13)*** and leather meal presents a risk for anthrax and heavy metals ***(14, 15, 16).***

When they are hydrolysed, they should then also be considered synthetic. When they are not, they will not accomplish their task. Chile finds it surprising that on their turn those products have been introduced as a substitute for meat, blood and bone meal that in some countries became forbidden following the BSE pandemic. It should be mentioned that last year at CODEX Montreal IFOAM supported the Canadian request to exclude those products as organic rapid N-fertilizers for this very reason.

Regarding the "*general perception*", Chile has interviewed many consumers of organic products and found that:

- None of the interviewees knew that above mentioned animal waste products were used as fertilizer.
- Most of them thought this was risky and not within the spirit of organic agriculture and some made analogies to the BSE controversy.
- Some indicated that they choose organic meat for the sole reason that they were queasy about factory farming.

Chile would then ask the distinguished Codex Delegates, themselves consumers, if they wouldn't feel queasy or at least uneasy that their organic vegetables would have been grown that way. Or to put it simply: wouldn't **that** rather be a perception problem.

Some countries have mentioned that "*it is hard to differentiate between synthesized nitrate and natural nitrate and therefore it is difficult to understand why natural nitrate should be allowed!"*

Chile respectfully notes that this kind of statement can only come from, as IFOAM would say, "readers unfamiliar with the subject". Chile recommends among others the reading of the recent outcome in the USA of the much publicized lawsuit won by an organic farmer, supported by non-profit groups like the Organic Consumers Association, Sierra Club, N-E Organic Farmers, against the then secretary of Agriculture (Harvey vs Veneman). Consequently inputs like synthetic potassium hydroxide, certain kelp extracts,

synthetic methionine etc. will now be **forbidden** for use in Organic Agriculture in the USA exactly **because** they are synthetic (and are "identical" to the natural sources.

Further Organic Agriculture promoters have always insisted in the past about the so important trace plant nutrients in natural inputs such as calcified kelp, which is Ca, Mg carbonate i.e. dolomite limestone. Chile then asks why this would then not be important in NSN, particularly when its trace nutrient element content is significant. Last but not least the "naturalness" of a substance is one of the principal criteria (See Codex criteria, section 5.1).

In terms of consumer perception, Chile is concerned that the impression would then be given that in organic farming natural inputs could be substituted implicitly by their synthetic equivalents. This would most probably add serious confusion in the mind of the consumer. Indeed, in polls taken among consumers time and again, health and naturalness are mentioned as the most important reasons for buying organic products.

Chile as a developing country with an expanding organic sector would like to appeal to organizations like IFOAM and FiBL (active in Chile) to educate organic farmers and consumers based on data driven information and actively react against the perpetuating of prejudices and wrong perceptions. If information about nitrate as an essential plant food would be divulgated as such and not (unconsciously and certainly not deliberately) confused with nitrate pollution and the cause of the presence of nitrates in the crops, organic farming would gain much in credibility which would enhance its success.

Chile is concerned that a different attitude would on the contrary put the sustainability of the organic movement itself in danger.

For a more comprehensive and in-depth reply to the IFOAM 2004 evaluation of NSN we refer to the replay of Chile sent to Codex late 2004.

We would like to conclude with the following comments from Elizabeth Henderson at the IFOAM, April 2004 conference about Organic Principles: "*The roots of the founding thinkers of organic agriculture, Sir Albert Howard, Rudolf Steiner, and others, reach back into the peasant wisdom and indigenous knowledge, accumulated over millennia of Asia, Europe and Africa."*

It is indeed a peasant wisdom that, when a farm animal dies, to bury the animal and not to "recycle" its remainders as fertilizer over the fields and the crops.

As an illustration Chile informs that in the museum of Natural History in Santiago, Chile one of the prominent leather objects is "el lazo maldito" or the "damned lasso": in fact during a whole generation it transmitted deadly Anthrax to people. In Chile till now farmers have not used animal remains as fertilizer.

On the other hand, due to its geographical isolation, Chile has been spared of many pests in its agricultural sector (it is for example the only country in the western world where Phylloxera has never infected the grapevines). Chile definitely wants to keep it that way. Chile has a budding organic farming sector with growing exports to the EU, Japan, Norway Switzerland and the USA.

It would not want to put this at risk by being forced to use questionable inputs that are contrary to the principles of organic farming in many aspects. In short it "rather be safe than sorry", to borrow the so often used expression in the organic world when discussing such controversial subjects as GMOs.

On the other hand NSN is a proven amendment that has been used well before the introduction of synthetic nitrogen some 100 years ago, when the entire world agriculture was in fact organic.

For more information on the health risks of current organic fertilizers and the perception issue we refer to the document "*The use of NSN in organic agriculture compared to authorized animal waste alternatives*" that can be downloaded from www.naturalnitrogen.com

That being said, Chile is not convinced that the actual evaluation process under the leadership of IFOAM is constructive and efficient as such process assumes care, thoroughness, factual data, consultation, involvement, respect from all partners, for other points of view and co-ownership which is the base for making sensible judgements and rational decisions.

Chile believes that the recent proposals for evaluating inputs seem to have a better chance to lead to a consistent and balanced judgment. These proposals brought foreword by the European Union ***(17)*** (under the stewardship of FiBL) and the United States point in the same constructive and data driven direction and are structured according to the CODEX Alimentarius recently introduced evaluation procedure.

Note: Chile would prefer to refer to the product as Natural Sodium Nitrate as this product is not exclusively found in Chile but also found in other countries as already mentioned in above referred to documents.

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CHILEAN PRESENTATION

CODEX DOCUMENT
JUSTIFICATION BASED ON THE CRITERIA
USE OF CHILEAN NATURAL NITRATE IN ORGANIC FARMING

As far as it is known in Chile, this is the first time that a full dossier is presented to the Codex Committee on Food Labelling (CCFL) for the purpose of obtaining the inclusion of a new substance based on the Organic Principles and scientific knowledge.

This dossier agrees with the strategic principle of the Codex Alimentarius Commission that indicates that "...decisions must be taken base on scientific evidence and taking into consideration the highest health levels for consumers...."

The proposal from Chile regarding the use of Natural Sodium Nitrate was submitted for analysis during the Montreal Session in May 2004. Given the fact that during this Session several delegations indicated that they did not have sufficient time to properly analyze the document, we take the liberty of attaching again a summary of its main aspects. The full document is available from the delegation of Chile or from the Codex Secretariat.

The recognized advantages of Natural Sodium Nitrate and its safety are in contrast with some fertilizer alternatives presently allowed in organic farming that are not satisfactory, particularly regarding its production processes and/or the health risks involved in these products.

Codex Alimentarius is to protect the health of consumers, with food labelling as the main communication media between producers and consumers. The Labelling Standard assumes total agreement between what is described on the label and the real content of the food; therefore the consumer that purchases (more expensive) organic products can trust that they will be safe and beneficial to health. However, it is regrettable that at this time there are nitrogen sources authorized that present health risks while Natural Sodium Nitrate, which is a source recognized as risk free and that complies with the organic criteria, is not authorized

As far as we know, only one formal reply following the Codex criteria has been received. The delegation of Chile recognizes and values that reply as a valuable effort, but does not agree with some of its concepts. This is the reason why, in the following section, we will give the opinion of Chile regarding each of the arguments, with technical replies within the concepts required by Codex.

REPLY TO THE ABOVE MENTIONED DOCUMENT.[1]

To facilitate reading the reply, we have subdivided the above mentioned document into numbered paragraphs.

ARGUMENT 1: The principles state that the 'fertility and biological activity of the soil should be maintained or increased, where appropriate, by cultivation of legumes, green manures or deep-rooting plants in an appropriate multi-annual rotation programme; incorporation in the soil of organic material...'

We are totally in agreement with this statement.

ARGUMENT 2: *Specific substances may be applied 'only to the extent that adequate nutrition of the crop or soil conditioning is not possible by [these] methods.' (Codex Alimentarius GL 32-1999, rev 2001, Chapter Annex I Principles of organic production point 5).*

It has been demonstrated that adequate nutrition for certain crops with fertilizers derived from animal or vegetable residues (not hydrolyzed) is not possible at all under certain climatic or critical conditions. This inadequate nutrition does not only produce deficient yields, but also a non satisfactory quality.
(When these residues are hydrolyzed they become a synthetic fertilizer whose use is directly against organic principles).

ARGUMENT 3: *Sodium nitrate application is directly counter to these principles because it contains no organic matter, and because it is possible to obtain adequate nutrition of crops from organic material without the application of sodium nitrate.*

In addition to increased consumer expectations, what has happened with the passage of time is that new high yielding varieties can not be nurtured in the same way than their low yielding predecessors if their yield and quality are expected to approach their potential (within the restrictions of organic farming). On the other hand, compost, for example, is considered as the best humus producer, but regrettably is not a good supplier of N. Therefore, a solution had to be found and it was apparently done in animal origin residues, such as blood, bone and feather meals, etc.

However, when the situation was more carefully studied, it was determined that a problem had been replaced by a series of other problems, real or potential, without any "organic" benefit.

[1] For further information of literature references, see the book "Natural Nitrogen, Nitrogenous rock" and the document "The Use of Natural Sodium Nitrate Compared to Authorized Animal Waste Products" which can be obtained from the following address: El Trovador 4285 Piso 5, Santiago, Chile. Furthermore, see the information on "Comments and answers to the IFOAM evaluation (1989) of Natural Sodium Nitrate (NSN)". A copy of such document can be found under www.naturalnitrogen.com

- Animal residues do not produce humus. One of the basic principles of organic production, and the most important one, is maintaining an adequate proportion of humus (unstable and stable) which, in turn, maintains and stimulates biological life throughout the vegetative cycle, maintains the soil structure, etc. Animal origin fertilizers do not provide any humus and their "sporadic" use will not stimulate bacterial life any differently than Natural Sodium Nitrate (NSN) (which does not mean they do not stimulate it).
- Furthermore, when animal or vegetable origin fertilizers are hydrolyzed – and many are – those animal or vegetable origin fertilizers do not even produce organic matter in the soil (SOM).
- They also present the following problems:

  - Hygienic problems: blood, bone and meat meals are banned in Japan and in many European countries due to the risk of BSE transmission. Feather meal has a similar and potentially even worst problem, chicken flue that in contrast to BSE is relatively easy to transmit to animals and people, and is equally lethal. Fish meal has high levels of PCB. (More information about health problems of fertilizers from animal residues can be found in the document: "The Use of Natural Sodium Nitrate Compared with Authorized Products from Animal Residues").

  By contrast, NSN has been used for over 100 years and it has never presented at all any health problems.

  - Trazability of organic waste is generally questionable. As a matter of fact, those wastes do not necessary have to come from organic farms. Therefore, contaminants such as antibiotics, heavy metals, etc., could be introduced to the system.

In brief, it could not be more direct and consistent to simply adhere to the principle that has been applied from the beginning of organic farming, which is to supplement organic vegetable fertilizers with natural mineral fertilizers (soluble or not) when it is really necessary, and to do it in the same way for all nutrients, including N and not only for P, K and Mg.

It is also important to mention that, in spite of the fact that the N and S cycles are very similar and that both nitrates and sulphates act in a similar manner, mineral S (S^{--}) and sulphates (SO_4^{--}) are authorized fertilizers although there are abundant organic sources of S.

Furthermore, the TAP[2] review regarding Chilean Nitrate, page 6, states that: "Smith (1992) determined that the nitrogen release curve for a combined cover crop/feather meal amendment was inadequate to supply late-season nitrogen demand in bell peppers."

The same TAP review, page 9, states that:

"[If Natural Sodium Nitrate is not approved], It seems inevitable that that an alternative source of N fertilizer with predictable nitrogen release characteristics will have to be found [but has not yet been found]."

ARGUMENT 4: Organic material that contains nitrogen enhances soil fertility for a longer period of time, and stimulates biological activity more than sodium nitrate.

First of all, a distinction is necessary between N carriers, such as compost and manure, which are basically "soil amendments" and fast sources of N such as animal origin manures, which are rather classified as so-called fertilizers, i.e. fast release N providers

1. N carriers as soil amendments.

ARGUMENT 4 states that "Organic material.....enhances soil fertility for a longer period of time, and stimulates biological activity more than sodium nitrate": This is apparently considered an advantage.

However, the same document, under ARGUMENT 17, states that: "*A nitrate fertilizer …...increases the metabolic rate of soil microbial biomass which in turn accelerates the mineralization of soil organic matter.* This is apparently considered a disadvantage. Therefore, the fact of stimulating biological activity (metabolic rate) is considered at the same time beneficial and not beneficial. This is an example of a contradiction in that document.

Similar contradictions have also been found in the TAP review of Natural Sodium Nitrate, criteria 5, page 5: "Additions of soluble nitrogen increase carbon mineralization rates, which may lead to a decrease in soil organic matter." This is considered an advantage. However, in the TAP review for synthetic potassium sulphate, criteria 6, it is determined that: "However, potassium sulphate has several advantages...potassium sulphate had a stronger effect on the mineralization of organic compounds."

Also, in the TAP review for synthetic potassium sulphate, Reviewer 3 states that: *"Criteria 1-5 are not relevant to this case. But this does not in itself qualify a substance for inclusion. It is not necessary for something to be grossly or subtly toxic or ecologically damaging for it to be inappropriate to organic farming. We could name several synthetically derived nitrogen fertilizer sources, for example, which if used in moderation, might not be harmful, and might in fact stimulate biological activity in the soil, yet these are clearly and unquestionably disqualified for inclusion on the National List. (Precisely because they are synthetic)". (As a matter of fact, although this is not the point here, the natural origin of mineral fertilizers is considered as very important criteria in this document).*

At first glance these are truly contradictions. This however should not be a surprise: an organic soil amendment is exactly that, and "amendment", and can not be always considered therefore as a reliable N provider.

Furthermore, long term experiments such as the continuous wheat experiment - Broadbalk Continuous Wheat Experiment (>140 years)- Rothamsted, UK, have demonstrated that soils receiving inorganic fertilizer contain a microbial biomass higher than the soils from corresponding experimental plots that did nor receive inorganic N (Shen et al., 1989).

Experiments conducted in the same locality, by Glendining et al. (1996), confirmed that the different rates of application of inorganic nitrogen fertilizer (48, 96, 144 and 192 Kg N/ha since 1852) did not have an effect in the content of microbial biomass, N, or C in the soil although there was some positive correlation with the specific mineralization rate of the biomass content (defined as mineralized N per unit of biomass). In spite of the fact that the amount of the microbial population appears unchanged, its activity was higher in soils that received continuous long term applications of mineral N fertilizer.

2. Fast acting N carriers

Fast acting nitrogen fertilizers such as feather, bone and blood meals, etc, act fast only because they contain "high amounts of mineral N" (TAP review for Natural Sodium Nitrate, page 7) or because they are hydrolyzed. As a matter of fact, its periodic introduction is not enough to maintain microbial life, which is one of the goals of organic farming.

Furthermore, NSN simulates very well microbial life but indirectly, through the increase of biomass (yield) and through synergy with organic fertilizer. As a matter of fact, the highest biological activity is obtained through the combination of an organic fertilizer and a supplementary mineral fertilizer such as Natural Sodium Nitrate or any other one that increases the pH. For example, earth worms: Research conducted by Edwards and Alto (1982) in Rothamsted, and other research articles quoted by Lampkin (2002), found that plots receiving organic and mineral N had the highest earth worm population.

The following quote from the TAP review for Natural Sodium Nitrate, page 7, also states that: *"If used in moderation, none of these nitrate-containing materials [Natural Sodium Nitrate, Potassium nitrate, etc.] would have serious detrimental effects on the soil biota. The presence of significant quantities of nitrate in organically managed soils is not unusual; following the breakdown of a legume cover crop, a build up of 10-20 mg* kg^{-1} NO_3*-N is common. Manure-based compost may also introduce substantial nitrate (*NO_3*-N) when irrigation is inefficiently managed."*

ARGUMENT 5: *While certain specific mineral fertilizers may be used to supply nutrients that are otherwise depleted, soil micro organisms dissolve these nutrients first. In organic farming one of the basic principles is to fertilize/nourish primary the soil and not directly the plant. In contrast, sodium nitrate is immediately soluble without being digested by soil organisms.*

However, the intentional use of NSN in organic farming (and, in that sense, of all fast release N sources (already authorized)) should be to improve the efficiency of N and to decrease N losses during some critical development stages, and also to improve crop quality and yields. In these specific development stages this can be obtained only if that source of N is available to the plant and, therefore, present in the soil solution. Solubility is therefore essential in this context.

Furthermore, potassium sulphate, magnesium sulphate, patentkali, sodium chlorate and other nutrients, as well as trace elements in the forms authorized in organic farming are "immediately soluble without being digested by soil organisms."

ARGUMENT 6: *Some papers indicate that sodium nitrate has no effect, either beneficial or adverse, on soil organism populations. However, studies show that soluble nitrogen fertilizers simplify soil ecology and reduce biodiversity of soil organisms.*

Regarding the first part of this paragraph, we make reference to the comments advanced in reply to ARGUMENT 4 of this document. However, no documented support has been found for the second part (of course, as repeatedly mentioned, NSN is used according to the intended manner). On the contrary, the replies to ARGUMENT 4 and to ARGUMENT 5 discredit this comment.

As mentioned before, it has never been the intention to replace organic nitrogen fertilizers with NSN; it is only proposed for use as a supplement. The supplementary use of NSN would be a very positive contribution for the population of soil organisms. Long term research suggests an even higher contribution than the one achieved when using only organic fertilizers.

ARGUMENT 7: *In particular, research has shown that applications of soluble nitrogen fertilizers in general and sodium nitrate in particular depress the activity of nitrogen fixing organisms...*

It has never been the intention that the application of NSN in organic crops be used as the only source of N, but rather an harmonious and synergetic supplementary use to organic fertilizers already authorized, taking advantage of the strengths of both types of fertilizers to supply N during the critical period of nutritive deficiencies.

The activity of nitrogen fixing organisms is not affected in that case. On the contrary, the activity of nitrogen fixing organisms is exactly what is missing at that precise point in time and, therefore, it is one of the causes of N deficiency rather than an effect. There should be no confusion between cause and effect.

ARGUMENT 8: *The allowed mineral fertilizers are different rocks, natural rock phosphate, calcium and magnesium carbonate, gypsum and others. The nutrients are generally not in an easy soluble form. In case of Chilean nitrate the substance is a water soluble extract of caliches; the rock used, and is not comparable with the hardly soluble rock phosphates and the other mineral fertilizers (see below).*

Calcium, magnesium carbonate, and gypsum are mainly used as soil conditioners and not as fertilizers.

Potassium sulphate, and magnesium (Patentkali[3]), magnesium sulphate, and sodium chlorate are all very soluble, however they are allowed as organic fertilizers. PK fertilizers in particular are mainly used as a base to be added to the large amount of P and K already present in the soil. This is not the case for N, which has to be applied, at most, a few weeks before planting and/or mainly as a supplement after the crop is established (side-dressing).
The supplementary application (side-dressing) of P and K is not usual, except occasionally in critical conditions. Under those conditions they are applied as foliar spray, as are trace elements. Comments could be made about the questionable application form, and the not-natural (non-organic) use of these very soluble and synthetic fertilizers.

The TAP review of synthetic potassium sulphate (SOP) indicates in page 6 that: *"Currently, the National List allows the use of naturally derived inorganic potassium salts in cropping systems. These may consist of K^+ in combination with Cl^-, SO_4^{2-}, NO^{3-}, PO_4^{3-}, and $P_2O_4^-$. Sylvite, sylvinite, and langbeinite are the most common mineral K sources (Thompson, no date). These substances are highly soluble, and may be used in addition to green manures and composts when the latter are considered inadequate in terms of timing, form, or nutrient concentration. Sylvite is a mineral salt composed primarily of muriate of potash (KCl), and the refined substance contains 60-62 percent K_2O"*.

The objective of using Natural Sodium Nitrate in organic farming (and for the same purpose, other authorized fast release N carriers) must be to improve the N efficiency and reduce N losses during some critical growth stages and, similarly, to improve crop quality and yield. In these phenological stages this improvement can only be achieved if the source of N is available to the plant and, therefore, present in the soil solution. Solubility is therefore essential in this context.

ARGUMENT 9: *In organic farming systems, nitrogen is obtained from crop rotations that include nitrogen-fixing leguminous crops, free-living nitrogen fixing organisms, and the application of compost and manure.*

This is agriculturally correct and represents an ideal situation but, regrettably, sometimes a serious lack of synchronization is present in the N cycle. N supply becomes insufficient due to a lack of synchronization and appropriate location of mineralization regarding certain critical growth stages. The N cycle can not be isolated from other physical, chemical and nutritional conditions when agricultural production is being considered. Furthermore, much of the N from organic fertilizers is lost. Four main types of N losses can be identified in the farm:

1. Losses due to ammonium volatilization;
2. Losses through oxidized N gas compounds;

3. Losses due N leaching, run off and erosion;
4. Losses due denitrification through gas compounds.

The first and third type of losses are by far the most important ones in most countries (moderate climates) and represent, for example, 85% of the total N losses that took place in farms in Switzerland during 1994 (Biedermann & Leu, 2003). Leaching of organic nitrogen (as compost and manure) is one order of magnitude higher (~10 x) than for mineral N fertilizer (Kirchmann & Bergström, 2001). Furthermore, in organic farming, the use of municipal wastes (due to heavy metals, hygiene, etc.) is not allowed for crop production – particularly for crops exported outside the farm. The technique of using legumes permitted, in principle, to fill an important N gap but, as mentioned above, it is only partially satisfactory.

ARGUMENT 10: Plant and animal by-products can be used to provide supplemental nitrogen.

See ARGUMENT 3 in this document.

ARGUMENT 11: *Organic farming relies on "slow release" fertilizers by using less soluble mineral fertilizers, but also with the use of organic nitrogen fertilizers. Therefore, given the abundance and ready availability of such sources, Sodium nitrate is unnecessary and cannot be considered essential for its intended use.*

The possibilities of applying them in organic farming after the crop is established (side-dressing) are limited, as available organic fertilizers are not adequate to fill the N gap at critical moments due to their slow release characteristics (Zanen et al., 2003; Loiusbolk Institute Wageningen).

Supplementary fertilizers, such as feather, bone and blood meals, are convenient at first glance as their nitrogen release is relatively fast. (TAP review for Chilean Nitrate, page 7: "…several common materials (blood meal, feather meal, and hydrolyzed fish powder, for example)….." contain substantial amounts of mineral N.

All of them however present one or more of the following deficiencies:

- Either their N is released too slowly (in the case of non hydrolyzed animal or vegetable residues), and therefore is not able to satisfy the critical N demand.
- And/or they represent a serious health risk (most waste products, such as blood, feather, leather and fish meals, and some vegetable waste products, such as ricin cakes)
- And/or they contain a high level of nitrates that, when it is not known by the user, may lead to a wrong rates of application or a wrong timing of the application (for example, fish liquid).

Furthermore, the use of NSN has other unexpected advantages, and the TAP review for Natural Nitrate confirms this on page 9: "*There are other reasons for keeping the*

Chilean nitrate source in organic farming. Reduced tillage systems are currently being considered and would benefit all types of agriculture. Converting organic farming to reduced tillage would be difficult without a readily side-dressable form of nitrogen fertilizer. Composts and manures are difficult to side dress with current technology. Chilean nitrate has similar physical properties to conventional nitrogen fertilizer preparations and therefore make it amendable to be sidedressed. This would be especially important in vegetable row crop systems".

ARGUMENT 12: *Most sodium nitrate fertilizer is mined in Chile. The environmental impact is similar to that of other mined minerals.*

The environmental impact of Natural Sodium Nitrate extraction is not similar to mining nor to the extraction of other mined minerals, being significantly friendlier to the environment in comparison to phosphoric ore, potassium sulphate, kainite, potassium ore, sylvinite, Patentkali (magnesium potassium sulphate), kieserite, and Epsom salt (all of them authorized in organic farming).

Furthermore, the non renewable energy used is only about 40% of the total amount used per N unit in the production of synthetic N fertilizers (SQM 2004, EFMA – European Fertilizer Manufacturers Association –2004). This will be further improved in the near future.

ARGUMENT 13: *Given the geographically limited reserves and isolated supply, the transportation of nitrogen long distances has a potential to cause greater adverse environmental impacts than most other mined minerals. In most areas in the world there are local resources available for the production of organic commercial fertilizers, however these might be more expensive or more complicated than manufacturing sodium nitrate.*

All mineral resources are limited. This is also the case for potassium, phosphate, "*maerl*" (calcified marine algae). Chilean nitrogenous ore will last at least several centuries. China is also exporting nitrogenous ore, with other deposits having recently been discovered in Kazakhstan.

Regarding the environmental impact due to long distance transportation, the following reflections must be made: Knowing that 1 kg of N produces at least 20 kg of wheat (assuming average yields) (Finck, 1979), it could be much more environmentally friendly to import the fertilizer (by ship) that to import the wheat.

The same reasoning can be made, for example, regarding the choice between importing early season vegetables by plane (in boxes, and the boxes in a container for aerial shipment) instead of a much small amount of NSN by ship.

Also, even without taking into account the environmental and sustainability criteria ("food-miles"), as well as other criteria included in the holistic organic system, exclusively economic arguments suggest the option of local production (if all other economic parameters are the same).

However, in Switzerland for example, over 95% of organic cereals are imported from overseas (Switzerland's export and import statistics, Direction générale des douanes, Bern, 2002). "It would be worth to produce these cereals locally" (Cahiers del la FAL 45, 2003; page 26). However, to improve the quality, meaning a better protein content (baking quality), a better N nutrition must be achieved.

ARGUMENT 14: *Research has shown that crops fertilized by sodium nitrate will have significantly higher levels of free nitrate than crops fertilized with compost or manure. This effect is most pronounced in winter when fertilizing with pure soluble sodium nitrate is the only nitrogenous soil amendment. Sodium nitrate potentially increases the nitrate content in leafy vegetables such as salads. Although this risk must also be taken into consideration when using organic fertilizers, the unique use of Sodium (Chilean) nitrate in the spring which would be likely the case in practice, raises this risk.*

Organic crops in general can be effectively lower in nitrate when compared to crops fertilized with high doses of mineral N. However, taking into account the (recent) evolution of (conventional) farming practices, particularly regarding N fertilization and, furthermore, when nitrate is used only to cover certain critical crop needs as a supplementary fertilizer and not as a sole source of N, nitrate accumulation is not expected. As a matter fact, the proposed use of Natural Sodium Nitrate is supplementary as part of a systemic method.

Any fertilizer (mineral or organic fertilizer easy to decompose, such as blood, bone and feather meals, beans, manure, etc) may increase the accumulation of nitrate, particularly with excessive application rates (Termine et al., 1987). To avoid the excessive use of any nitrogen source, including organic soil conditioners, is exactly the purpose of this supplementary use of NSN, as part of a holistic systemic method.

Regarding the TAP review of Natural Nitrate in page 7: *"It is true that application of this product late in the crop cycle of leafy greens (the expected use pattern) would increase the nitrate concentration of the produce, but it would be very unlikely to result in levels deemed a health hazard by current standards. In my research on conventionally grown lettuce produced in the Salinas Valley, I have never found nitrate levels in the edible portion to exceed the standards set by the European Community, even in field situations where excessive amounts of synthetic fertilizer was used. Other researchers have found that conventionally produced California spinach occasionally exceeds these standards, but the likelihood of any organic production, even with the use of sodium nitrate, approaching or exceeding these standards is remote"*. The intention is the supplementary use, synchronized with the plant's N absorption rhythm and certainly not in "excessive amounts".

ARGUMENT 15: *Nitrate will be reduced in the human body to nitrite, which has been linked to methemoglobinemia, a potentially fatal condition whereby nitrites interfere with oxygen uptake. Pregnant women and small children are at a particularly high risk from methemoglobinemia. Nitrites can also be further reduced to nitrosamines which compounds are strong carcinogens.*

The previous reply, to ARGUMENT 14, makes this argument irrelevant, although the risk link between nitrates and methemoglobinemia has lately been shown not to exist.

It should be pointed out that, in this case, the organic condition for the use of Natural Sodium Nitrate must be evaluated, as limitations to the use of different forms of N are an issue across all N sources as well as being the subject of another forum, where food safety is being addressed. It should also be emphasized that such argument would also affect conventional crops.

ARGUMENT 16: *Organic growers throughout the world have successfully developed systems that use compost, green manure, and plant and animal by-products to supply the nitrogen needed to grow all commercial crops throughout the year over a wide range of climates and soils.*

This statement is not true, and is being refuted with scientific evidence obtained in field experiments conducted by organic farming researchers in Europe and the United States.

ARGUMENT 17: *An organic fertilizing system is based on cultivation of legumes in a crop cycle with cash crops and green manure in combination with farmyard manure and compost where available. Such a system contains a balance of nitrogen and carbon sources, both of which nourish soil organisms that are essential for the cycling of nutrients. Carbon stabilizes the soil biomass and provides energy to soil organisms. Nitrogen is stored in the form of proteins that are slowly released by the biological decomposition of organic matter. By contrast, sodium (Chilean) nitrate contains no carbon and supplies soluble nitrates in a simple form similar to synthetic fertilizers such as potassium nitrate or calcium nitrate. A nitrate fertilizer that lacks carbon creates a carbon: nitrogen imbalance that increases the metabolic rate of soil microbial biomass that in turn accelerates the mineralization of soil organic matter. The crop response and increase in soil fertility is short-lived.*

Attention is called about the above mentioned contradiction regarding ARGUMENT 4 that can be summarized with the following question: Does organic matter and organic fertilizer have a double function or only one objective? i.e. Soil amendment and N provider, or only soil amendment?

If it is also assumed that they are nutrient providers under all circumstances, then they should be able to mineralize sufficient nitrate exactly at the moment when the nutrient demand is present and critical. If not, nitrogen fertilizer with available N that would preferably stimulate mineralization should be added.

Even if, when using NSN, *"…the increase in soil fertility is short-lived"*. – and we have already indicated in previous paragraphs that this is not the case due to the increase in the return of crop residues. – similar statement would be true for fast action (and rapidly exhausted) N fertilizers such as blood, bone and feather meals, etc., which have a C/N ratio or approximately 3, much closer to urea than manure and

compost, for example, which have C/N rates of 18 and 14 respectively (Berner et al., 1997).

ARGUMENT 18: *With organic commercial fertilizers it is also possible to get a higher mineralization in cold soils for vegetable growing in the early season. These commercial fertilizers are for example based on horn or feather meal, malt sprouts, fish meal, or bean meal among others. With these fertilizers it is possible to grow even heavy feeding crops such as cauliflower with products found on annex 2 in the early spring. Although such fertilizers are usually more expensive per unit of nitrogen and often more difficult to handle, they are nonetheless available alternatives that better maintain the long-run fertility and condition of the soil and are more suitable for crop rotations than sodium (Chilean) nitrate..*

See comments regarding ARGUMENT 3 and ARGUMENT 10 in this document.

ARGUMENT 19: *More research is clearly needed to improve the efficiency of organic sources of nitrogen, but this does not support the case that sodium nitrate is essential.*

NSN is essential because it was demonstrated that in critical nutritional situations it represents a better systemic method than organic inputs.
One could be in agreement with the first part of this paragraph but, in spite of the fact that research could improve the efficiency of organic sources, nature is not unlimitedly flexible.
Furthermore, some deficiencies of organic manures can not be eliminated (except, for example, thorough chemical processes such as hydrolysis and treatment with acids) and other problems may be created, such as the possible accumulation of associated nutrients (P, K).
See also the TAP review for synthetic SOP (potassium sulphate), page 8, criteria 6.

ARGUMENT 20: *The Chilean source fulfils the criteria of being a source of mineral origin without further chemical processing. However, sodium nitrate may also be synthesized by a number of processes (Collings, 1950).*

No chemical transformation is used, not even ion exchange, which makes it unique among mineral fertilizers, including those used in organic farming. Of course, "sodium nitrate may also be synthesized by a number of processes" (this is also the case for potassium sulphate, etc.), however, this is not the case for Natural Sodium Nitrate (Natural Chilean Nitrate).

"An essential difference among many natural and synthetic fertilizers is their degree of purity. Poultry manure not only contains nitrogen but also provides all nutrients needed for the plant. Natural Sodium Nitrate has many additional substances in contrast to synthetic sodium nitrate, which is essentially a chemically pure compound. The tendency to increase the purity of fertilizers is not at all a reason for them to be

considered harmful. It does however represent a potential food quality risk due to a possibly localized application of the fertilizer. On the other hand, a higher degree of purity also ensures smaller amounts of possibly harmful substances" (Finck, 1979).

The following quote is from the TAP review for synthetic SOP (potassium sulphate): *"We could name, for example, several synthetically derived nitrogen fertilizer sources which if used in moderation, might not be harmful, and might in fact stimulate biological activity in the soil, yet these are clearly and unquestionably disqualified for inclusion on the National List. (precisely because they are synthetic)"*

This clearly indicates that nitrogen fertilizer of synthetic origin should not be used and also why natural origin nitrogen fertilizer should be used.

ARGUMENT 21: *Most of the sodium nitrate mined in the Atacama desert is processed into potassium nitrate, with iodine a significant co-product (USGS). A certain amount of chemical processing may take place to separate the iodine and remove toxic impurities such as perchlorates. At present, most of the beneficiation involves raising the potassium level and does not appear to be used to maintain the fertilizer guarantee levels in the sodium nitrate. However, products identified as "nitrate of soda-potash", "Chile salpeter", or "niter" would not meet this criterion and should not be considered "Chilean nitrate" even though they originate from Chile and contain nitrate.*

The previous statement is difficult to understand. As previously mentioned, NSN is also called Chilean Nitrate and has been obtained in Chile for approximately the last 150 years through simple concentration of the leached solution.
The evolution of the extraction methods, in over 150 years, has only involved an increase in the concentration, purity and physical presentation (granulation).
(Note: "*Chile salpeter*" means Natural Nitrate in German).

ARGUMENT 22: *Although only small amounts of sodium nitrate are known to exist at present, it is conceivable that another commercial deposit could be opened somewhere else in the world. "Chilean nitrate" implies that one nation should be given license to control an international monopoly over the production of a given input. For the purpose of clarity, the dossier should refer to 'natural sodium nitrate' and not 'Chilean nitrate'*

Yes, the file does refer to Natural Sodium Nitrate. In China, the Turpan Desert, (in the province of Xinjian, in the north west of China) NSN is being produced from ore for several years and, recently nitrate containing ores have been discovered in Kazakhstan.

ARGUMENT 23: *Sodium nitrate accelerates the mineralization and depletion of soil organic matter, in contrast to organic nitrogen fertilizers that maintain and improve soil organic matter.*

As previously mentioned this, together with ARGUMENT 17, contradicts ARGUMENT 4. The issue of mineralization has already been extensively discussed. It has been demonstrated that Natural Sodium Nitrate does not have a negative effect on the soil organic matter, with the opposite being the case through its indirect effect, as it increases yields and, therefore, also increases the return of crop residues. See also comments to ARGUMENT 4, ARGUMENT 6 and ARGUMENT 7.

In the experiment, of 40 year duration (1963-2003), of Vuillioud et al. (2003), three different cultivation practices were compared (mineral fertilizer, mineral fertilizer + crop residues, and mineral fertilizer + poultry manure). The results indicated that the volume of organic matter in the soil was not significantly influenced by any of the three fertilization systems. Test 8 of Limburgerhof (23 years) (Jürgens-Gschwind & Jung, 1977) demonstrates that a higher level of humus is obtained when mineral fertilizer is added in the manure application: 1.70% against 1.94% of humus.

The results of the long term experiments, previously mentioned, suggest that the supplementary use of NSN would not have a direct impact on microbial biomass, expressed as organic mater content, and that such microbial biomass would not be negatively affected. Furthermore, only vegetable residues, and only if not hydrolyzed, can increase soil organic matter. Fertilizer produced from animal residues, such as bone and feather meals, etc., does not increase soil organic matter (SOM), other than indirectly through yield increases and, therefore, higher amounts of crop residues left in the fields. The same could be said of Natural Sodium Nitrate.

ARGUMENT 24: *Nitrate is highly mobile in soil. Nitrate that is not immediately assimilated by plants can be leached in the ground water.*

See ARGUMENT 9 in this document

ARGUMENT 25: *The salt index of Chilean nitrate is 100, which is higher than almost every other fertilizer (Rader et al., 1943). For most crops and in many areas, the addition of sodium which can pose a problem in some areas. In irrigated regions or in greenhouses it is necessary to leach the sodium periodically "out of the system" to prevent the salinity of the soil. A higher consumption of water and a load of salt to the environment is the negative impact/consequence.*

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- The Sodium concentration in the soil will remain well within its natural range when NSN is normally used.
- From the TAP review for synthetic SOP (Potassium sulphate):

  - page 3, International Certifiers: "The UN FAO Codex Alimentarius guidelines allow the use of "rock potash" and "mined potassium salts" which are "less than

60% chlorine.": However, the most purified KCl fertilizer (60% K_2O) has "only" 48% Cl. This would mean that the Cl level allowed is unlimited.

- page 4, criteria 2: "By comparison, potassium chloride (muriate of potash) has a benchmark salt index of 116, higher than both sodium nitrate (100) and ammonium nitrate (105)."

- page 5, criteria 3 in Table 1: "manure salts" (20%) have a salt index of 5.6 * 20 = 112

TABLE 1 Salt Index of some inorganic potassium fertilizers

Material	%P_2O_5	Salt Index per Unit of Plant Nutrients
Manure salts, 20%	20.0	5.636
Potassium chloride	60.0	1.936
Potassium nitrate	46.6	1.580
Potassium sulfate	54.0	0.853
Potassium magnesium sulfate	21.9	1.971

Adapted from Rader et al. 1943

Mistake: In the above table, instead of P_2O_5, it should say K_2O.

- page 5, criteria 5: "…sodium (Na^+) is similar to potassium in its chemical properties, and has been shown to substitute partially for potassium in some crops (Thompson, no date)."

- page. 6, criteria 6: "Sullivan and colleagues (2000) report that manures contain 0.6% salts on a dry weight basis, and that 20 tons of fresh manure would add 90lbs of salt/acre."

- page 6, criteria 6: "Unrefined sylvinite (KCl•NaCl) contains 20-30 percent K_2O." (and 20-25% of Na, and 30-40% of Cl). Silvinite is an authorized natural mineral fertilizer. The magnesium-kainite is also an authorized natural mineral fertilizer with 20% of Na. NSN does not even contain Cl.

- page 7, TAP Reviewer # 1, criteria # 5: *"In this regard this product is preferable to the use of manure-based composts, which have higher salt content (including chloride) per unit of K content. Use at reasonable agronomic rates has minimal consequences on soil salinity."* This declaration is even truer (expressed per nutrient unit) when all relevant data is taken into account: salt indexes, K and N content, and the efficiency of K and N fertilizers. As a matter of fact, NSN has a lower salt index per kg of absorbed N than potassium sulphate per kg of absorbed K. Furthermore, given the previous statement by the TAP Reviewer, NSN has a lower salt index per kg of absorbed N even than the corresponding values for poultry manure and compost.

- page 7, criteria 6: *"Manure composts can contain substantial K, but repeated use of these products can result in a build-up of soil P to environmentally*

undesirable levels. Furthermore, manure composts can contain high salt concentration, which requires leaching to maintain soil productivity."

- TAP review of Natural Nitrate.

  - page 7, Reviewer # 1*: "Much is also made about the high salt index of sodium nitrate, but application of this product at the levels allowed under section 205.602(h) presents little risk in either of these regards. In the eastern U.S. annual rainfall is generally sufficient to maintain salt balance, and in the West the amount of sodium applied in this fertilizer pales in comparison to that contained in most irrigation waters. Also, organic soil building practices generally provide sufficient organic matter to maintain good soil tilth."*

- The following are more quotes and references regarding sodium in organic conditioners and fertilizers:

  "The salt index of liquid manure is very high. This material kills earthworms and hardens the soil", NODPA News (Northeast Organic Dairy Producers Alliance, U.S.A), vol. 2, issue 2, July 2002.

  "Composting reduces the amount of raw material by approximately *2/3, yielding as manure close to 35% of the weight of the original raw material. The concentration of sodium in livestock manure can produce manures with sodium concentrations too high for some uses such as potting mixes"*. Recipes to build compost windrows, Dr. Paul Walker, Department of Agriculture, Illinois State University, U.S.A..

  "Most studies that involve salinity have been directed towards the effect of inorganic fertilizers on plant growth and mineral nutrition. However, literature is scarce regarding the response of crops to short term application of composted manure under saline conditions". "The influence of composted manure and salinity over growth and nutrient content in corn tissues" by Irshad m., Yamamoto S., Eneji A.E. and Honna T., Soil Science Lab, Faculty of Agriculture, Tottori University, Tottori City, 680-8553, Japan.

  "Normally dry manure has 4 to 5% of soluble salts (on dry weight basis) and may be as high as 10%. To illustrate this, an application of 5 tonnes of manure, with a 5% sat content, would add 500 lbs. of salt.", Ecochem, Innovative Solutions. for Sustainable Agriculture & Management, March 2004.

ARGUMENT 26: *Although some organic fertilizers can also leach nitrates and salts, the impact is reduced by the smaller percentage and lower solubility of sodium and nitrate contained in such products. Risks of sodium and nitrate contamination are more easily managed by the use of Good Management Practices, such as application at appropriate soil temperatures and moisture. Because sodium nitrate is highly soluble and has a high salt index, such management practices are less effective at mitigating such harmful effects.*

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The sodium (salt) problem has been previously addressed in the reply to ARGUMENT 25.

The nitrate problem has been previously addressed in the reply to ARGUMENT 9

The previous quote was: "*Although some organic fertilizers can also leach nitrates and salts*". Furthermore we also have the following comments: Organic fertilizers are presently the main source of leached nitrates, not only in general terms but also per nitrogen fertilizer unit (Total and net N absorbed by the plant).

Also, the fact that available N and absorbed N are actually much lower in organic fertilizers, means that much higher equivalent amounts are needed (up to 15 times higher) producing therefore higher losses.

The previous statement that: "*....the impact is reduced by the smaller percentage and lower solubility of sodium and nitrate contained in such products. (organic fertilizers)....*" deserves the following comment. It is difficult to understand the way by which the solubility of sodium and nitrate would be lower in organic fertilizers. There seems to be a confusion between organic N and mineral N (nitrate) and Na.

The solubility of fertilizers in general, and of N fertilizers in particular seems to be considered as a negative trait in organic farming. However, the purpose of using Natural Sodium Nitrate in organic farming should be to improve the N efficiency and to reduce N losses during some critical growth stages and therefore, improve crop quality and yield. At those specific growth stages this can be achieved only if the source N is immediately available for the plant and, therefore, present in the soil solution. Thus, solubility is essential in this context.

ARGUMENT 27: *The Caliche used to produce Chilean nitrate contains perchlorate as a contaminant. Per- chlorate is mobile in the soil as nitrate. Perchlorate was discovered in a number of US water supplies, prompting the US EPA to add it to its Contaminant Candidate List. The ecological impact of perchlorate is not well known. Perchlorate has been discovered in crops, including organically produced lettuce. The contamination of perchlorate in potable water is difficult to treat..*

First of all, all the mistakes and confusions evident in the previous argument must be immediately corrected: The problem with perchlorate in the United States does not have anything to with the product exported to the USA.

Perchlorate is a synthetic inorganic anion which also occurs naturally. Perchlorate is manufactured to be utilized, among others uses, as oxidizing agent, as a component of pyrotechnics, and for inflating car air bags. Through years of manufacturing, testing and inappropriate waste disposal by these industries, a general presence of perchlorate has taken place from the Colorado River and the subsurface water in California, to other States in the USA. No other documented perchlorate contamination site has been found anywhere else in the world.

The EPA has determined that perchlorate traces in Natural Sodium Nitrate do not have any effect on crops or over the environment.

ARGUMENT 28: *In the relatively few cases where sodium nitrate has been permitted, it has been restricted to use only as a supplement to an organic soil building program, or to a specific crop such as spirulina. Sodium nitrate can enable a farm that is going through transition to avoid a crop failure when the soil biological activity has not been established to provide nitrogen from organic sources. However, such farms have developed a long-term dependence because the addition of sodium nitrate depresses the organisms needed to effectively cycle nitrogen.*

It has been sufficiently proven, at the experimental level, that under different agro-ecological conditions, nitric nitrogen provided by organic sources is not enough to produce the expected crop yield and quality.

See also the replies given to ARGUMENT 4 and ARGUMENT 7.

ARGUMENT 29: *In such situations, some authorities have attempted to limit the amount of nitrogen provided by sodium nitrate. Monitoring a numerical limit on nitrogen contributions has proven to be a recordkeeping burden on the farmer, a verification problem for inspectors, and an administrative burden on the certifier.*

In organic farming all the inputs are strictly supervised, and this includes records kept for each of them.

ARGUMENT 30: *Experience with growing spirulina under standards where Sodium nitrate is prohibited has demonstrated that Sodium nitrate is not necessary for this particular crop.*

It can be expected that the Spirulina producers' community would not agree with this statement, with the obvious question being that: If there is no serious justification, why did Spirulina producers requested, and obtained from NOP (National Organic Program), an amendment for the unrestricted use of sodium nitrate in the USA, and from the local authorities in India?

ARGUMENT 31: *Historical development of the regulatory situation of Chilean Sodium Nitrate in Organic farming. The use of sodium (Chilean) nitrate from natural deposits has been one of the most contentious and divisive issues throughout the organic farming's history. The first IFOAM Basic Standards published in 1980 permitted the restricted use of Chilean Nitrate, reflected by the fact that the fertiliser was still allowed in some countries. IFOAM has published several papers on the subject, recognizing the value of its use, particularly with regard to nitrogen uptake in cold weather at the beginning of the growing season (IFOAM 1984). However even at that time the use of*

sodium nitrate has been criticised as unnecessary and seen as a controversial practice. In 1984 the use of sodium (Chilean) nitrate was restricted to the use during conversion. Based on an extensive literature review (IFOAM Technical Committee, 1989) and broad discussions with the IFOAM member organizations, the General Assembly in 1989 decided to prohibit sodium (Chilean) nitrate in the IFOAM Basic Standards. The reasons for exclusion correspond with those listed in the table above.

The decision of not authorizing the use of NSN was based on a literature review (IFOAM, Technical Committee, 1989), which was subject to wide discussions and interpretation as it did not include information based on objective facts conductive to a clear definition (See "Reply to IFOAM 1989 document" which can also be found at www.naturalnitrogen.com).

However, the present proposal is based on the Standard approved by Codex in 2001, and should be evaluated according to it.

ARGUMENT 32: *The Codex Working group considered sodium (Chilean) nitrate in 1997 and 1998 when the criteria for fertilisers were discussed. When the first Codex Alimentarius guideline was published, the Codex Alimentarius Commission decided to not include sodium (Chilean) nitrate in the Annex. For the same reasons as IFOAM, the European Union, the Japan Organic Standards as well as most of the international certifiers (including major US certifiers) do not allow the use of Chilean Sodium Nitrate in their standards. In the NOP Chilean Nitrate is still allowed, however with restrictions. In a recent review (2002) of sodium (Chilean) nitrate by the USDA National Organic Standards Board Technical Advisory Panel (NOSB TAP), two reviewers were in favour of removing Chilean Nitrate while one favoured a phase out to permit farmers to develop viable alternatives. The Organic Trade Association's American Organic Standards, a voluntary private standard of the organic industry in the United States prohibited the use of sodium nitrate effective January 1, 2003 (OTA, 2003).*

The reply to the above mentioned ARGUMENT 31 is also valid in this case.

ARGUMENT 33: Because of the salt index and sodium content, sodium nitrate is considered by many agronomists and soil scientists to be an inferior source of nitrogen to ammonium nitrate, calcium nitrate, or potassium nitrate. Unlike these other forms of nitrate, sodium nitrate does not provide any additional fertility benefit besides nitrogen, instead carrying with it sodium, generally recognized to be detrimental in most soils.

Again, in the TAP review for synthetic potassium sulphate, the last page of the TAP[3] indicates that: "*Criteria 1-5 are not relevant to this case. But this does not in itself qualify a substance for inclusion. It is not necessary for something to be grossly or subtly toxic or ecologically damaging for it to be inappropriate to organic farming. We could name several synthetically derived nitrogen fertilizer sources, for example, which if used in moderation, might not be harmful, and might in fact stimulate biological activity in the soil, yet these are clearly and unquestionably disqualified for*

inclusion on the National List. (precisely because they are synthetic)". This clearly underlines the great importance of the natural origin (not synthetic) of inputs and, at the same time, it refutes, indirectly but clearly, some important prejudices against nitrate mentioned in the IFOAM publication.

Furthermore, taking into account the replies and comments to all aforesaid ARGUMENTS, which have been provided to the reader as a comprehensive set of reasons and counterarguments, it is probable that the NSN is one of the best examples of an input that supports the systematic (holistic) method so highly appreciated and fundamental in organic farming.

ARGUMENT 34: *Sodium nitrate is an anomaly that undermines the case that organic food is better for soil and water quality than other food. Consumers who pay a premium for organic food in part because it has lower free nitrate levels than food grown with synthetic fertilisers are cheated when "organic" vegetables grown in the cold season with sodium (Chilean) nitrate are no different ceteris paribus from those grown with a conventional fertiliser like ammonium nitrate, calcium nitrate, or potassium nitrate. While sodium nitrate lowers production costs in certain situations, the principles of organic farming are undermined by its use.*

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All the above answers are valid against this argument, and, furthermore:

- The supplementary use of NSN will allow organic farmers to optimize their production. As well, access to a more economical source of N will give organic farmers a competitive marketing advantage and will contribute to the maintenance of rural communities.

- It was clearly demonstrated that the wise use of Natural Sodium Nitrate respects and supports the principles of cyclic precaution and proximity, so highly appreciated by the organic agricultural community. It supports expressions of value and ethics, such as: "reliability", "biologically strong", "the general standard of good nutrition", "the well informed agriculture", "sensible ecological balance", "excellence in agriculture", "productivity with sustainability, "maintenance of rural communities", "the shortest supply chain", etc.

Natural Sodium Nitrate, as a natural and essential fertilizer for plants, has demonstrated to be a valuable contribution to the success of organic agriculture. This would allow organic farming to significantly improve in the following aspects: productivity, sustainability, potential to produce better quality fresh foods, compliance with the logistical requirements to offer a fair treatment to consumers, promotion of intensive local work, shortening the supply chain, and promoting national self confidence.

Its wise use is part of common sense agriculture and reflects the biological reality.

Natural Sodium Nitrate is not an “anomaly” but rather a gift of nature.

Before the introduction of synthetic nitrogen, when all world agriculture was basically organic, farmers already used this nitrogen rock to maintain soil fertility. Natural Sodium Nitrate was used as organic fertilizer before organic farming became a world wide movement.

ANNEX

CODEX DOCUMENT

JUSTIFICATION BASED ON THE CRITERIA

USE OF CHILEAN NATURAL NITRATE

IN

ORGANIC AGRICULTURE

CHILEAN PRESENTATION

CODEX DOCUMENT
JUSTIFICATION BASED ON THE CRITERIA
USE OF CHILEAN NATURAL NITRATE IN ORGANIC AGRICULTURE

SUMMARY

The use of Natural Sodium Nitrate (NSN) containing 16% nitric nitrogen (N) and 26% sodium is consistent with all organic agricultural production principles according to concepts and evidences known for many years, as well as the results of recent studies that have been reviewed and are quoted in this document. NSN promotes biodiversity and increases biological activity as it releases available N when organic sources can not do it. It also helps maintain long term soil fertility, as it assists in the formation of humus from substances with high carbon content in relation to nitrogen (a high C/N ratio). Its contribution of natural sodium helps prevent soil acidification and is beneficial to halophylic crops (beets, vegetables, forages). In addition, NSN provides small but significant amounts of Potassium, Magnesium and Sulphur and also of Copper, Forum and Magnesium which are essential trace elements for crops.

Its proper use does not harm nor contaminate the environment. The contaminant elements - Cadmium, Arsenic, Chrome and Lead – are less than 1mg per kg-1, and the total of heavy metals expressed as lead is less than 5 mg per kg-1. These levels are among the lowest among natural fertilizers.

Natural Sodium Nitrate is a natural substance, extracted only through mechanical and hydraulic means, without chemical reactions. It is a natural source of N in nitrate form which, with ammonium N, constitute the only two chemical sources of nitrogen that can be absorbed by plant roots. As a readily available nitrogen source it is a supplement to organic N sources. Those sources require time and favourable soil conditions for their organic N to be transformed, through the activity of soil micro organisms, into other forms of nitrate and ammonium that can be absorbed by the roots. The factors that can limit the supply of N from organic sources have the same effect over Sulphur (S) sources as their organic and chemical behaviours are similar. However, the problem with Sulphur has already been solved for organic agriculture, as the present organic norms allow supplying Sulphur as natural inorganic sulphates. This is translated into an asymmetrical treatment for both nutrients.

The formation of Natural Sodium Nitrate is more than 200,000 years old, and it is found in the Atacama Desert. This desert is totally arid, with less than 2 mm of rainfall per year, without any biological life, or soil, or any soil formation process, to the point that NASA studies compare it to the inert surface of Mars. The formation of Natural Nitrate is supposed to have been promoted by atmospheric conditions.

Given the scarcity of water, no liquid effluents are emitted by the mining facilities. All solutions are recycled and water is lost only through the solar evaporation system, a key component of the process.

The technical use of the substance as fertilizer guarantees no negative impacts over human life, the ecosystem or the environment. This last point is a requirement for the use of almost any agricultural input. Regarding other sources that may supplement the 19 organic substances of slow release of available N, there is not known alternative to Natural Sodium Nitrate that would be both natural and provide easily available N without need being transformed.

Regarding its use as fertilizer, several studies have demonstrated that the exclusive use of organic N sources does not allow good crop yields or good food quality in the harvested foods. This is due to (a) the limited amounts of N provided by these sources in relation to the amount required by the crop, and, (b) due to the difficulty of synchronizing the supply rate of N from the organic source with the rhythm of N absorption by the crop. The above said is a particular problem in temperate or cold climates and during the winter season, as has been demonstrated by different research studies in Europe and in the USA. This is prejudicial to organic farmers, limiting their income, as well as to the public, which is deprived of organic foods certain times of the year. Natural Sodium Nitrate provides natural N for crops all year round and under the most diverse soil, climatic and management conditions.

The extraction of Natural Sodium Nitrate from the Caliche ore in the Atacama Desert involves only mechanical and hydraulic means that do not harm the environment, with sunlight playing an essential role as a source of renewable energy for such process. The solar energy captured is of the order of 25 Giga Joules (GJ) per metric ton of natural N in the product extracted from the Caliche ore. Synthetic N fertilizers use on average 40 GJ of non-renewable energy per ton of N, with Natural Sodium Nitrate falling within this average at 44 GJ per ton of N. The great difference is that the extraction of Natural Sodium Nitrate only uses 19 GJ of non renewable energy, which is the equivalent to only 43% of the total energy used to produce chemical fertilizers, with the remaining 57% being solar energy. Natural Sodium Nitrate is not only natural in origin, but also most of the energy used to extract it is renewable energy.

The limitations for the use of Natural Sodium Nitrate are saline and sodium soils, which are conditions easily identifiable through routine analysis in soil labs. Furthermore, its use may not be advisable for soils with poor internal drainage or arid conditions with little rainfall and no irrigation. These conditions limit crop production and the use restrictions do not only apply to NSN but also to other inputs.

ANEX 1
MATRIX FOR THE EVALUATION OF SUBSTANCES BASED ON THE CRITERIA

Substances for Use in Soil Fertilizing and Conditioning.
Scoring: ++ very positive; + positive; 00 not to evaluate; - negative; - - very negative.

Substance: Natural Sodium Nitrate, NSN, as a source of nitrogen for crops.

Section 5.1 General Principles

Criteria	Evaluation Based on the criteria	Scoring	*Proposed by*
Consistent with the principles of organic production	Natural Sodium Nitrate (NSN) is a source of natural Nitrogen (N) that supplements the N from organic sources. Is found in the Caliche ore of the inert surface of the Atacama Desert, and it is extracted by mechanical and hydraulic means without the use of chemical processes. It supplements organic nitrogen, promotes biodiversity and increases biological activity as it releases available N when organic sources can not do it. It also helps maintain long term soil fertility as it assists in the formation of humus from substances with a high carbon content in relation to nitrogen (a high C/N ratio). Its proper use does not harm nor contaminate the environment.	**++**	
Necessary for its intended use	NSN provides nitrogen (N) in a form that is directly absorbed by the plant roots without need of biological transformations. Its nitrogen is readily available in all seasons, particularly when climatic conditions impede the organic transformation required to release the available nitrogen. Its contribution of natural sodium helps prevent soil acidification and is beneficial to halophylic crops (beets, vegetables, forages). NSN provides small but significant amounts of Potassium, Magnesium and Sulphur, and also Copper, Forum and Magnesium which are essential trace elements for crops.	**+ / ++**	

Criteria	Evaluation Based on the criteria	Scoring	*Proposed by*
Lowest negative impact on human or animal health and quality of life	All organic Nitrogen forms are transformed in the soil to inorganic nitrate and ammonium forms which are the only ones that can be absorbed by plants. NNC has the same nature that the nitrate that results from organic transformations. Therefore, no damage to soils, crops, animals or the quality of life should be expected when it is used according to the needs of soils and crops. Sodium is also a natural constituent of the soil profile, and the amounts of Sodium applied with NSN are within the normal natural limits of Sodium in the soil. Sodium, being an alkaline element, neutralizes acidity produced by the decomposition of organic substances. The amounts of Cadmium, Arsenic, Chrome and Lead are less than 1mg per kg^{-1}, and the total of heavy metals expressed as Lead is less than 5 mg per kg^{-1}. These levels are among the lowest in natural fertilizers.	+	
Approved alternatives not available in sufficient quantity or quality	*NSN is the only not-organic natural substance that provides Nitrogen in the available form of nitrate and that does not need biological transformations to be available, transformations that depend on temperature and other conditions that control the activity of soil micro organisms and the availability of N from organic sources.*	+	

Section 5.1 (a) Use in Soil Fertilizing and Conditioning.

Criteria	Evaluation Based on the criteria	Scoring	*Proposed by*
essential for obtaining or maintaining fertility of the soil or fulfil specific nutrition requirement of crops, soil conditioning and rotation purposes witch cannot be satisfied by the practices included Annex 1, or other products included in Table 2 of Annex 2.	Nitrogen is essential for soil fertility and crop production. All organic N has to be transformed to ammonium and nitrate forms to be absorbed by the plants. The transformations are made by micro-organisms and depend of temperature, pH and other soil conditions. Research has demonstrated that the N provided exclusively by organic sources is less than the amount required for the crops to produce good quality and acceptable yields. This is due to (a) the insufficient amounts of N in organic sources and, (b) the difficulty of synchronizing the supply rate of available N from organic sources with the rate of N absorption by the crop during the growing season. This last effect may result in leaching of the N provided at a non-appropriate time. Due to the fact that the N supplied by NSN can be absorbed immediately, the doses of applied N, as well as the timing of the applications can be controlled, thus meeting the nutritional requirements of each crop.	+	
Substance is of plant, animal, microbial or mineral origin; may undergo the following processes: Physical (Mechanical, thermal), enzymatic or microbial (composting, fermentation); only when the above processes have been exhausted, chemical processes may be considered and only for the extraction of carriers and binders	NSN is extracted by leaching the milled Caliche ore with a weak salt solution at 40-45º C. After leaching the ore, the solution is cooled to 12º C to precipitate the NSN. The wet NSN is dried, granulated and stored or shipped to be used as a source of N for crop production. After the NSN is precipitated, part of the weak salt solution may be concentrated in the ponds of the solar evaporation system before starting a new cycle of NSN precipitation. The solar energy captured is 25 Giga Joules (GJ) per metric ton of natural N in the extracted NSN. Synthetic N fertilizers use on average 40 GJ of non-renewable energy per ton of N, with Natural Sodium Nitrate falling within this average at 44 GJ per ton of N. The great difference is that the extraction of Natural Sodium Nitrate only uses 19 GJ of non renewable energy, which is equivalent to only 43% of the total energy used, with the remaining 57% being renewable solar energy.	++	

Criteria	Evaluation Based on the criteria	Scoring	*Proposed by*
Use may be restricted to specific conditions, specific regions or specific commodities	*NSN is not recommended for saline and sodium soils. Those conditions are easily identifiable through routine analysis in soil labs. The use of NSN is also not advisable for soils with poor drainage or dryland agriculture with little rainfall and no irrigation. However, under those limiting conditions, the restrictions for its use do not only affect NSN but are also applicable to other inputs. In the United States the use of NSN is limited to 20% of the N required by the crop.*	+	

CHILEAN PRESENTATION

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APPENDIX VIII

PROPOSED DRAFT GUIDELINES FOR THE PRODUCTION, PROCESSING, LABELLING AND MARKETING OF ORGANICALLY PRODUCED FOODS - PROPOSED DRAFT REVISED SECTIONS ANNEX 2 - PERMITTED SUBSTANCES (At Step 3 of the Procedure)

ANNEX 2

PERMITTED SUBSTANCES FOR THE PRODUCTION OF ORGANIC FOODS

TABLE 1: SUBSTANCES FOR USE IN SOIL FERTILIZING AND CONDITIONING

Substance	Description; compositional requirements; conditions of use
[Natural Sodium Nitrate]	*[Product obtained from nitrogenous rock through physical processes, using mainly solar energy. Used as a supplement to organic nitrogen sources and according to the edapho-climatic local conditions. Must be certified by a certification body or authority.*