

BENEFICIAL IMPACT OF APPLICATION OF SLOW-CONTROLLED NUTRIENT RELEASE SULFUR COATED UREA (SCU) FERTILIZER ON THE ENVIRONMENT/HEALTH AND THE EVER INCREASING FOOD SHORTAGE IN THE WORLD

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Introduction:

SCU manufactured in accordance with the Hanfeng Technology & Know-how is a field proven quality and value-added controlled nitrogen release fertilizer, and a source of elemental sulfur as a slow release nutrient. Hanfeng's SCU with its unique and varied characteristics makes this fertilizer a significant contributor to efficient plant, crop or vegetation growth yield increase, economic to apply by farmers, environmentally/health friendly, and a vital contributor to resolve the global food shortage problem.

This Presentation deals mainly with the beneficial impact of value-added SCU applied within a properly managed fertilization system on the Environment and Health of the ecosystem we live in. Being an evolutionary ecosystem we live in, we want our children, grand-children, great grand children, animals and plants to enjoy within the expansion of the universe and its unknown eventual destination, our creation towards success not failure.

As stated in the IFA (Paris, France,2010) Paper, "Slow-and Controlled-Release and Stabilized Fertilizer", by M.E. Trenkel, Shoji and Gandeza (1992) defined that an "Ideal Fertilizer" should have as a minimum the following characteristics:

- A single application should supply enough nutrient throughout the entire growing season to meet plant demand for optimum growth;
- A maximum percentage recovery to achieve the largest return for the cost of the input.
- Minimum detrimental effects on the soil, water and atmospheric environment.

Additionally M.E. Trenkel writes, quote: " To these important characteristics needs to be added: minimum, preferably none, detrimental effects on the health of humans, animals and plants to secure the future of our planet earth with all its living creatures, humans, animals and plants" unquote.

The global agronomic fertilizer industry is being challenged by nature and its ecosystem. Traditionally fast acting fertilizers such as urea, a very important basic macro nutrient to assure the availability of food throughout the world, causes by extensive over- usage and ill-managed application globally wasteful losses of N-nutrients into the soil and into the atmosphere. Urea nitrogen (N) has been identified as one of the top global pollution and health threats on earth. The destruction of our environment, the health of our fauna and flora, the population growth explosion are the true challenge for the agronomic industry in a not too distant future. Application of enhanced efficiency and environmentally friendly slow-controlled release fertilizers with intelligent fertilizer application management needs urgent attention with proper education of all humans.

Impact on the environment:

I wish to outline briefly the destructive impact on the environment and health of humans and animals as we experience now primarily caused by urea nitrogen, taking into account that exceeding 65,000,000 Mt/year urea is produced and more manufacturing plants are ready to start operation:

Nitrogen Leaching

Urea nitrogen mostly oxidizes to nitrate due to microbial activity in the soil. Typically urea applied directly on the soil by a farmer during the growing season may lose between 40% to 60% of the applied urea nitrogen as an unused nutrient because of leaching in a single application. Large accumulations of nitrate levels in the soil have become a serious pollutant. Via run-off waters and water tables the nitrates enter the drinking water for humans and animals. In the human and animal metabolic system nitrates are converted to nitrites. Nitrates are a basic cause for methaemoglobinemia in infants (blue baby syndrome); gastric cancer and other cancers via nitrite formation, and potential other diseases such as goiter, birth defects and related to the heart.

Volatilization of Ammonia

Urea and other surface applied ammonia compounds are causes for ammonia volatilization into the atmosphere, particularly in calcareous and alkaline soils. Ammonia gas emissions from urea or other ammonia compound fertilizer application may result in depositing ammonia in other specific ecosystems damaging local plants, crops and vegetation. Even, it is possible that the NH₃ is oxidized to form nitric acid subsequently react with sulfuric acid formed from other sources resulting in acid rain formation.

Emission/Formation of Nitrous Oxides

The use of urea, nitrate and ammonia compound fertilizers have a direct and indirect effect on N₂O and NO emissions. Fractions of ammonium are converted to NO and N₂O during nitrification. Note that these gases are also formed during the de-nitrification of nitrates. Nitrous oxide is multiple times more potent than carbon dioxide, CO₂ being one of the leading causes of the greenhouse effect and consequent climate changes. Emission/formation of nitrous oxides effects the global warming and causes destruction of the ozone layer exposing humans and animals to excessive ultraviolet radiation impacting negatively on the health.

Impact on Food

Excessive leaching of unused urea fertilizer into the soil causing accumulation of nitrates in plants, crops and vegetation (eventually converted to nitrites in the human and animal metabolic system) are consumed as a source of food by humans and animals, and may initiate the same negative health effects which result from nitrate drinking water pollution.

Impact on the Ecosystem

It has become a fact and we have lots of evidence in our fauna and flora, our world, that the global problem caused by nitrate and ammonia gas pollution is leading into an ecological crisis for nature. In accordance with a study published in the year 2010 in the Nature Journal, reactive nitrogen was identified as one of the nine key global pollution threats. Nitrogen chemicals such as nitrates wash into lakes, rivers and the sea resulting in rampant eutrophication, nitrous gases remain in the atmosphere destroying the ozone layer, ammonia gases settle on mountains and in valleys changing the flora once reigning in its beauty.

As reported by the Associate Press researchers have found major increases in the presence of ammonia gas in air quality data collected throughout 15 USA National Parks which include the Rocky Mountains, Yellowstone, Mount Rainier and the Canyon Lands Parks. At these high mountain fields delicate local flora is being replaced by nitrogen based plants and grasses. Serious negative impacts can be found abundantly in coastal regions where excessive nitrogen chemical and other unwanted chemical compounds have replaced the nutrients for the sea animals and driven them away. The Global Ecosystem is being altered fast. In China and in the USA, not mentioning the other parts of the world, more than 40% of all applied nitrogen fertilizers enter nature "unused".

The negative environmental/health impact summary which I outline here provides us clearly with the immense problems we all, fauna and flora, face now, and in the future, if we do not act together, this means we, we all. M.E. Trenkel's Paper, I referred to earlier (2010, IFA, Paris, France), states that the impact of fertilizer use is lessened by all those measures that improve nutrient use efficiency (NUE). This means increasing the useful uptake of nutrients such as urea nitrogen by plants, crops and vegetation, thus leaving less unused nutrients in the soil, less available for volatilization, leading to a reduction in fertilizer application.

Hanfeng SCU advantages:

Low-controlled nutrient release fertilizers such as value-added Hanfeng manufactured SCU have the unique characteristics and capability to synchronize the nutrient release pattern, here urea nitrogen and elemental sulfur, with the plant, crop or vegetation selected required nutrient uptake to achieve its "goal": economical for farmers, improved healthy growth yield and friendly to the environment, the flora, and the health of the fauna, the ecosystems of this world we live in.

Hanfeng SCU is produced by coating granular urea as a substrate with molten sulfur and a wax sealant in an Operating Process Model controlled Coating Drum. It is important that the wax sealant applied consists of bio-degradable non-pollutant components from natural origin as is the proprietary Hanfeng wax coating. Polymer coatings applied need to be harmless to the environment and to the health of humans and animals, and should not leave any residual pieces of plastic coating in the soil following field application. In this respect being a slow-controlled nutrient release fertilizer with its unique benefits Hanfeng SCU is different from other slow-controlled release fertilizers. Sulfur is an ideal coating for slow-controlled release application, it is insoluble in water, its applied layer thickness defines the urea nitrogen release characteristics, it does not absorb moisture or is subject to abrasion such as plastic coatings, another difference between Hanfeng SCU and others.

SCU, invented in the early 1960's, is the oldest slow-controlled release fertilizer. Hanfeng manufactured SCU is successfully applied for rice paddies, wheat, corn, plantation crops, green house grown crops, oil seed crops, vegetables, a variety of fruits, grasses, ornamentals, recreational fields and others. Some of the many benefits of SCU, besides the ones already discussed, are worthwhile to mention:

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- SCU controls excess application /consumption of urea nitrogen
- Reduces over- stimulation of early crop growth and excess take up of urea nitrogen
- Encourages more uniform growth during the growing season
- Protects seedlings from the harmful effects of urea placed within or close to the seed row
- Eliminates the need for multiple straight urea fertilizer application during a growing
- Contributes to uniform flowering, seed set and fruit formation all of which gives a better and more uniform produce and minimizing the harvesting work
- Results in significant growth yield increase for many plants, crops and vegetation
- In spite of a higher market price than urea, SCU is economic and cost effective compared with urea as urea may require up to three times a field application during the same growing season, while SCU over the same season is only applied just once, reducing labor costs, energy, and urea fertilizer need.

SCU because of its slow-controlled nutrient release capability and its unique benefits, is an efficient fertilizer to help fight the ever increasing global food shortage problem in the world by significantly increasing the growth yield of plants, crops and vegetation, and being a contributor to provide the sulfur depleting soils in many places globally with the fourth most important nutrient "Sulfur", a natural pesticide.

To conclude, the Hanfeng Evergreen Inc. SCU manufacturing Process Model is designed to produce a range of SCU Fertilizer products, capable to release into the soil nitrogen urea as a controlled release fertilizer, and elemental sulfur as a slow release fertilizer, either over a short or an extended time period during a farmer's growing season economically, agronomic efficiently, beneficially to the environment/health, and as a contributor to help fight the rapidly developing global food shortage crisis.



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