

The future of farming

How nano-farming is set to revolutionize the agricultural sector

By M. Abdul Momin

In the past, all the household trash was placed in a compound, where it would, after some time, rot and serve as fertilizer. Dung or feces from animals at home were composted and applied on the soil. All this resulted in good harvest outcomes. During the late 1960s, the introduction of chemical fertilizers like urea, phosphorus, and potash enabled remarkable rises in crop yields. Soil fertility started to decrease.

Transitioning from traditional tactics to chemical fertilizers

Due to extensive intensive farming using traditional practices, chemical fertilizers became progressively vital in ensuring soil fertility and recording more than expected production levels. Farmers intensified their use of chemical fertilizers — specifically nitrogen, phosphorus, and potassium (NPK) — which are key macronutrients. But it is seen that only 30 to 34% of fertilizers utilized by farmers to fertilize soil and safeguard crops is utilized by the crops. The remaining 60% to 70% is wasted and combined with nearby water bodies or other water bodies, thus causing damage to the environment.

A further source of concern is the prevalent misconception among farmers that the application of more quantities of fertilizer results in better yields. Therefore, they apply the fertilizers in huge quantities. However, after application, the fertilizer loses approximately 20% through evaporation into the air as a gas or percolation into the water and soil, thereby polluting the environment. This process not only decreases the soil's fertility but also aggravates global warming since ammonia let into the atmosphere raises its temperature.

Nano fertilizers: A breakthrough in farming

For the sake of curbing global warming, scientists have invented a breakthrough technology known as "nano-fertilizers." Its dimension is calibrated in nanometers. A nanometer is ten to the negative nine meters, or one billionth of a meter. When a substance is reduced to that infinitesimal level, its potency is multiplied several times, much like atomic energy. Nanoparticles are just a little larger than molecules in terms of their size.

Scientists are optimistic that a nano-fertilizer, made by embracing the world's newest nanotechnology, has the revolutionary potential to boost the yield

of crops, decrease the production cost, and uphold the environmental balance.

Jashore University's success with nano fertilizers

To their delight, Jashore University of Science and Technology Professor Javed Hossain Khan recently succeeded in making nano-urea locally through local technology. US-based organic fertilizer company "Colabio" has signed an agreement with Javed for commercialization of this particular fertilizer; they will also collaborate in research and development for the next five years.

The fertilizer will not just enhance crop yield but also reduce the costs of production and provide environmental harmony

Nanotechnology is the world's newest micro-technology that can penetrate plant roots easily and deliver needed nutrients. The fertilizer will not just enhance crop yield but also reduce the costs of production and provide environmental harmony.

How does a nano fertilizer work?

It is a fertilizer wherein many essential crop nutrients are mixed in small amounts, condensed, and polymerized. It has been discovered that crop plants readily absorb the nano-fertilizer. The benefit is that one fertilization can yield two crops. In our country, two or three crops are yielded in a year. Today, fertilizer has to be used repeatedly on crops, which accordingly pollutes the soil and water. Farmers have to buy these fertilizers. Even after subsidies, the production cost is increasing. The remedy to that too, is a nano-fertilizer.

How Nano fertilizers are expected to solve farming issues

By polymerizing dense nitrogen,



phosphate, potash, or any other nutrient using nano-fertilizers and giving it to the base of the plants, one can harvest a minimum of two crops using a single application. It has an active life of eight months. Therefore, as far as the use of fertilizer is concerned, nano-fertilizer is a new technology. The other side is its variation in application. Farmers in our nation purchase nitrogen and

phosphate in bags. They take three bags, spread a mat next to the field, pour the fertilizer on it, and then proceed to mix it by hand. It is interesting to note that a phosphate granule is significantly larger than a urea granule, and a urea granule is significantly smaller than a phosphate granule. Additionally, potash granules are crystalline in nature. The three fertilizers are then blended together. When it is

broadcasted, the bigger granules are what become available first, and therefore the space the bigger granules drop gets more phosphate. Subsequently, another space gets more urea, and another gets more potassium. If a field owned by a farmer is, for instance, twenty decimals, a third of it gets more phosphate, a third gets more urea, and a third gets more potassium. What will be the effect? There will be a yield difference.

Government institutions such as the Bangladesh Rice Research Institute (BRRI) in collaboration with private institutions such as ACI Limited, and other public and private research institutions in Bangladesh have already conducted test trials of nano-fertilizers. It is anticipated that this initiative will bring about a revolutionary change in the prevention of fertilizer wastage and ensure its application in proper doses.

For instance, to fulfill the demand for rice, the country's staple food, a total of 60 million tons of paddy are cultivated every year. To cultivate this quantity of crop, roughly 1 million tons of urea fertilizer are used on farm land yearly, and 80% of such a requirement is fulfilled through imports. The high volume of imports of fertilizers creates a foreign exchange cost increase annually, whereas application of chemicals simultaneously decreases the soil fertility of cropland. The application of nano-fertilizers might be the potential solution.

According to Professor Javed Hossain Khan the government purchases one kg of urea for about Tk30. However, it sells to farmers at Tk27 per kg at retail level. The government thus provides a subsidy of at least Tk3 per kg.

Increasing the use of nano-urea fertilizer, the production cost of crops can be reduced by at least 50%

Why nano-fertilizers are the need of the hour

Experts believe that by reducing the use of conventional urea fertilizer and increasing the use of nano-urea fertilizer, the production cost of crops can be reduced by at least 50%. Javed also assured, fertilizing one bigha of land with nano-urea will cost just Tk30 only. The application of nano-urea has the potential to reduce this expenditure by at least half. On this count, if Javed's nano-fertilizer is made available to farmers, as is the case in developed countries, it would introduce a paradigm shift to the farming sector by an overall increase in production.

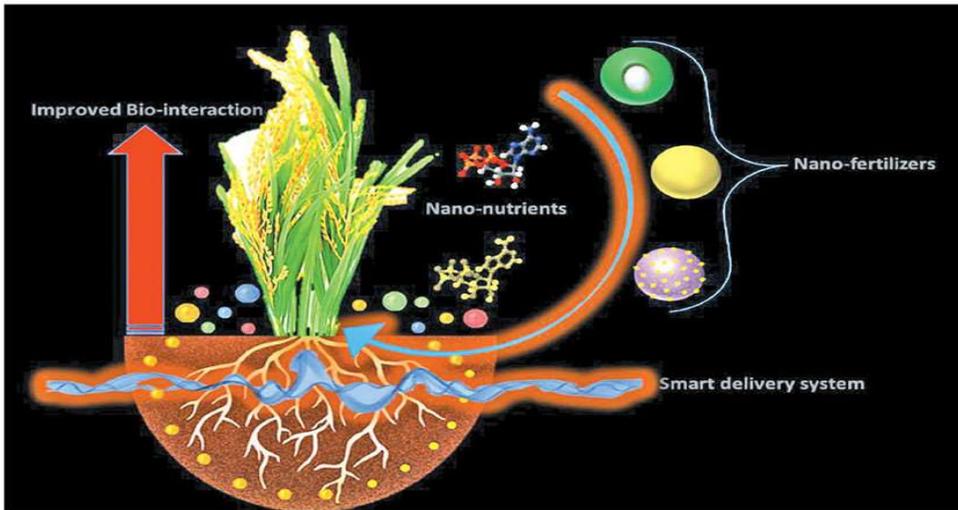
It is also necessary that we increase the use of organic manures. Our soil is getting compacted due to ongoing cultivation practices. Oxygen is needed below the soil to encourage microbial activity, and the soil needs porosity.

Without an organic fertilizer, the soil will ultimately suffer. There is a huge amount of waste produced in our country, which comprises rice straw, household waste, cow dung, and chicken dung, which cumulatively account for a tremendous amount of waste. If we can efficiently collect the waste and process it with the help of microbes, the fertilizer thus obtained will, on one hand, make the soil more porous and, on the other hand, enhance water holding capacity. The application of this organic fertilizer will enhance the roots and provide plant growth with the required constituents. It is evident that the application of this organic fertilizer will enhance soil fertility. Once other fertilizers are applied, plants will be able to absorb these nutrients, resulting in a very high crop production. ■

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Future of Farming: Potentials of Nano-Fertiliser



Dr. M. Abdul Momin

Fertiliser is one of the major inputs for farming. In the past, people usually put their household trash in a compound, where it would, after some time, rot and serve as fertiliser. Domestic animals' faeces were composted at home and used in the croplands. And this resulted in good harvest outcomes. Meanwhile, chemical fertilisers like urea, phosphorus and potash were introduced during the late 1960s, which caused remarkable rises in crop yields. Soil fertility started to decrease, however, in the case of extensive traditional farming practices. Chemical fertilisers thus became progressively vital in ensuring soil fertility and increased production. Farmers intensified their use of chemical fertilisers such as nitrogen, phosphorus and potassium (NPK), which are key macronutrients. But it is seen that only 30 to 34 per cent of fertiliser that farmers use to fertilise soil and safeguard crops is utilised by the crops. The remaining 60 to 70 per cent is wasted and combines with nearby water bodies, thus causing damage to the environment.

Another concern is the prevalent misconception among farmers that the application of fertiliser in greater quantities can bring better yields. Therefore, they apply the fertilisers in huge quantities. However, after application, the fertiliser loses approximately 70 per cent through evaporation into the air as a gas or percolation into the water and soil, thereby polluting the environment. This process not only decreases the soil's fertility but also aggravates global warming since ammonia let into

the atmosphere raises its temperature.

Scientists have found out a solution to this problem. With a view to curbing global warming, scientists have invented a breakthrough technology known as 'nano-fertiliser'. Its dimension is calibrated in nanometres. A nanometre is ten to the negative nine metres, or one billionth of a metre. When a substance is reduced to that infinitesimal level, its potency is multiplied several times, much like atomic energy. Nanoparticles are just a little larger than molecules in terms of their size.

Scientists are optimistic that 'nano-fertiliser' has the potential to boost the yield of crops, decrease the production cost and maintain the environmental balance. Professor Dr Javed Hossain Khan from Jashore University of Science and Technology has recently succeeded in making nano-urea locally through local technology. US-based organic fertiliser company 'Colabio' has signed an agreement with Dr Javed for the commercialisation of this particular fertiliser. They will also collaborate in research and development for the next five years to make the use of this fertiliser widespread. Previously, scientists at the Bangladesh Council of Scientific and Industrial Research (BCSIR) had taken initiatives to produce nano-fertiliser on a commercial basis; however, nothing tangible materialised. Nanotechnology is the world's newest micro-technology that can penetrate plant roots easily and deliver needed nutrients. The fertiliser will not just enhance crop yield but also reduce the costs of production and provide environmental harmony.

Let us know how nano-fertiliser works. It is a fertiliser wherein many essential crop nutrients are mixed in small amounts, condensed, and polymerised. This renders it stronger. It is discovered that crop plants readily absorb the nano-fertiliser.

The benefit is that one fertilisation can yield two crops. In our country, two or three crops are yielded in a year. Today, fertiliser has to be used repeatedly on crops, which accordingly pollutes soil and water. Ammonia also seeps into the air, polluting it. Farmers have to buy these fertilisers. Even after subsidies, the production cost is increasing. Then what is the remedy? The remedy is nano-fertiliser.

By polymerising dense nitrogen, phosphate, potash, or any other nutrient using nano-fertilisers and giving it to the base of the plants, one can harvest a minimum of two crops using a single application. It has an active life of eight months. Therefore, as far as the use of fertiliser is concerned, nano-fertiliser is a new technology. That's one side. The other side is its variation in application. Farmers in our nation purchase nitrogen and phosphate in bags. They take three bags, spread a mat next to the field, pour the fertiliser on it, and then proceed to mix it by hand. It is interesting to note that a phosphate granule is significantly larger than a urea granule, and a urea granule is significantly smaller than a phosphate granule. Additionally, potash granules are crystalline in nature. The three fertilisers are then blended together. When it is broadcast, the bigger granules are what become available first, and therefore the space the bigger granules drop gets more phosphate. Subsequently, another space gets more urea, and another gets more potassium. If a field owned by a farmer is, for instance, twenty decimals, a third of it gets more phosphate, a third gets more urea, and a third gets more potassium, what will be the effect? There will be a yield difference.

The solution to the mentioned problem is nano-fertiliser. Government institutions such as the Bangladesh Rice Research Institute (BRRI) in collaboration with private institutions such as ACI Limited and other public and

private research institutions in Bangladesh have already conducted test trials of nano-fertilisers. It is anticipated that this initiative will bring about a revolutionary change in the prevention of fertiliser wastage and ensure its application in proper doses. For instance, to fulfil the demand for rice, the country's staple food, a total of 60 million tonnes of paddy are cultivated every year. To cultivate this quantity of crop, roughly 3 million tonnes of urea fertiliser are used on farmland yearly, and 80 per cent of such a requirement is fulfilled through imports. The high volume of imports of fertiliser creates a foreign exchange cost increase annually, whereas application of chemicals simultaneously decreases the soil fertility of cropland. The application of nano-fertilisers might be the potential solution to this issue.

According to Professor Dr Javed Hossain Khan, the government purchases one kg of urea for about 90 Taka. However, it sells to farmers at 27 Taka per kg at the retail level. The government thus provides a subsidy of at least 63 Taka per kg. Experts believe that by reducing the use of conventional urea fertiliser and increasing the use of nano-urea fertiliser, the production cost of crops can be reduced by at least 50 per cent. Dr Javed also assured us that fertilising one bigha of land with nano-urea will cost just 230 Taka only. The application of nano-urea has the potential to reduce this expenditure by at least half. On this count, if Dr Javed's nano-fertiliser is made available to farmers, as is the case in developed countries, it would introduce a paradigm shift to the farming sector by an overall increase in production.

Along with this, it is the need of the time that we should increase the use of organic manures. Our soils are getting more and more compacted due to on-going cultivation practices. Oxygen is needed below the soil to encourage microbial activity, and the soil needs porosity. Without an organic fertiliser, the soil will ultimately suffer. There is a huge amount of waste produced in our country, which comprises rice straw, household waste, cow dung, and chicken dung, which cumulatively account for a tremendous amount of waste. If we can efficiently collect the waste and process it with the help of microbes, the fertiliser thus obtained will, on one hand, make the soil more porous and, on the other hand, enhance water holding capacity. The application of this organic fertiliser will enhance the roots and provide plant growth with the required constituents. It is evident that the application of this organic fertiliser will enhance soil fertility. Once other fertilisers are applied, plants will be able to absorb these nutrients, resulting in a very high crop production.

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৫২ প্রতিষ্ঠানকে ৫৮০০ টন সুগন্ধি চাল রপ্তানির অনুমতি

■ ইত্তেফাক রিপোর্ট

দ্বিতীয় দফায় দেশের ৫২ প্রতিষ্ঠানকে মোট ৫ হাজার ৮০০ টন সুগন্ধি চাল রপ্তানির অনুমতি দিয়েছে সরকার। প্রতিষ্ঠানের সক্ষমতা অনুযায়ী ১০০ থেকে ২০০ টন চাল রপ্তানির অনুমতি দেওয়া হয়েছে। অনুমতির এ মেয়াদ কার্যকর থাকবে আগামী ৩০ নভেম্বর পর্যন্ত। অর্থাৎ এর মধ্যে রপ্তানি প্রক্রিয়া সম্পন্ন করতে হবে। বাণিজ্য মন্ত্রণালয় সূত্র জানায়, ২৮ মে এ-সংক্রান্ত অনুমোদনপত্র প্রধান আমদানি-রপ্তানি নিয়ন্ত্রকের কার্যালয়ে পাঠানো হয়েছে। এর আগে গত ৮ এপ্রিল ১৩৩টি প্রতিষ্ঠানকে সক্ষমতা অনুযায়ী ১০০ থেকে ৫০০ টন করে মোট ১৮ হাজার ১৫০ টন সুগন্ধি চাল রপ্তানির অনুমোদন দেওয়া হয়। ঐ অনুমতির মেয়াদ কার্যকর থাকবে আগামী ৩০ সেপ্টেম্বর পর্যন্ত। অনুমোদন পত্রে বলা হয়েছে, এসব চাল আগামী ৩০ নভেম্বরের মধ্যে রপ্তানি করতে হবে। প্রতি কেজি চালের রপ্তানি মূল্য হতে হবে কমপক্ষে ১.৬০ ডলার।

এছাড়া রপ্তানির জন্য আরো কিছু শর্ত জুড়ে দেওয়া হয়েছে। এগুলো হচ্ছে- রপ্তানিনিতি ২০২৪-২৭ এর বিধি-বিধান অনুসরণ করা; অনুমোদিত পরিমাণের অধিক রপ্তানি করা যাবে না; গুল্ক কর্তৃপক্ষ

রপ্তানিযোগ্য পণ্যের যথাযথ পরীক্ষা-নিরীক্ষা করবে; প্রতিটি কনসাইনমেন্ট জাহাজীকরণ শেষে রপ্তানি সংক্রান্ত সকল কাগজপত্র রপ্তানি-২ শাখায় প্রেরণ করা; অনুমতিপত্র কোনোভাবেই হস্তান্তর করা যাবে না এবং রপ্তানিকারক কোনোক্রমেই নিজে রপ্তানি না করে সাব-কন্ট্রাক্ট দিতে পারবেন না; পরবর্তী আবেদনের ক্ষেত্রে পূর্ববর্তী অনুমোদিত পরিমাণ থেকে প্রকৃত রপ্তানির সকল তথ্য প্রমাণকসহ আবেদন দাখিল করা এবং সরকার প্রয়োজনে যে কোনো সময়ে অনুমতিপত্র বাতিল করতে পারবে।

দেশে সুগন্ধি চালের উৎপাদন বেড়েছে।

খাদ্য মন্ত্রণালয়ের তথ্য

অনুযায়ী, ২০২৩-২৪ অর্থবছরে দেশে ১০ লাখ ২৩ হাজার টন সুগন্ধি চাল উৎপাদিত হয়েছে। ২০১৭-১৮ অর্থবছরে এই উৎপাদন ছিল ৫ লাখ ৭৯ হাজার টন। অর্থাৎ, গত সাত বছরে উৎপাদন বেড়ে প্রায় দ্বিগুণ হয়েছে। সংশ্লিষ্টরা বলছেন, দেশে সুগন্ধি চালের চাহিদা বাড়ায় কৃষকরা এর চাষে আগ্রহী হচ্ছেন। ২০২৪-২৫ অর্থবছরের ডিসেম্বর পর্যন্ত রপ্তানি কার্যক্রম বন্ধ ছিল। পরে গত জানুয়ারিতে সরকার আবার রপ্তানি অনুমোদনের সিদ্ধান্ত নেয়। এরপর কয়েক শ প্রতিষ্ঠান চাল রপ্তানির অনুমোদন চেয়ে বাণিজ্য মন্ত্রণালয়ে আবেদন করে।

