

'Smart' fertilizers help feed booming global population while cutting pollution, slowing climate change

To feed the world's growing population, farmers need to increase crop yields. Applying more fertilizer could help. But standard versions work inefficiently and often harm the environment. Fortunately, products that are more ecologically sound—controlled-release fertilizers—are available and becoming increasingly smart.

Farmers typically spray fields with ammonia, urea or other substances that generate the nutrient nitrogen when they react with water. And they apply granules of potash or other minerals to produce phosphorus But much of the nitrogen goes into the atmosphere in greenhouse gases, and phosphorus ends up in watersheds, frequently triggering excessive growth of algae and other organisms.

Controlled-release formulations, in contrast, can ensure that significantly higher levels of nutrients reach the crops, leading to higher yields with less fertilizer.

.... These formulations typically consist of tiny capsules filled with substances that contain nitrogen, phosphorus and other desired nutrients. The outer shell slows both the rate at which water can access the inner contents to liberate the nutrients and the rate at which the end products escape from the capsule. As a result, nutrients are meted out gradually, instead of in a wasteful, rapid burst that cannot be absorbed efficiently

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