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ESPP workshops



Phosphate as a Critical Raw Material for food security

Wed. 19th November 2025 afternoon, Brussels & online

Phosphates and sustainable agricultural resilience. Phosphate rock supply for Europe. Challenges for the P fertiliser industry in Europe. How can P-recycling reduce EU phosphate insecurity?

P₄ (White Phosphorus) in 'Strategic' industries

Thur. 20th November 2025 morning, Brussels & online

Is P₄ (white phosphorus) a 'Strategic' Raw Material for Europe? Where are P₄-based chemicals used in 'Strategic' technologies: renewable energies (PV, batteries), electronics, aeronautics? Why P₄-derived chemicals should be in the new EU '[Critical Chemicals Alliance](#)'. P₄ supply projects in Europe.

Programme: <https://phosphorusplatform.eu/CriticalRawMaterialsWorkshops>

Register [here](#) (places in Brussels limited)

Proposals for presentations or posters are welcome at info@phosphorusplatform.eu

During the EU [Raw Materials Week](#).

Wed. 19th November 10h30 – 12h: ESPP General Assembly (Brussels & online, members only)

EU public consultations

Consultation for Circular Economy Act: deadline Thursday 6th November.

The first stage in preparing the future EU Circular Economy Act, announced for end 2026.

Your organisation can still sign the [joint call](#) to be submitted to this consultation. This calls for the Circular Economy Act to be ambitious for nutrient recycling, to forward sustainability, EU job creation, competitiveness, and food system resilience. The Joint Call proposes 16 actions and policy changes for the Circular Economy Act.

See details in ESPP eNews n°99 www.phosphorusplatform.eu/eNews099

EU public consultation on the Circular Economy Act https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14812-Circular-Economy-Act_en

ESPP detailed input to the consultation www.phosphorusplatform.eu/regulatory

Joint Call for nutrients in the EU Circular Economy Act www.phosphorusplatform.eu/regulatory

Sign now! Companies and organisations wishing to sign this Call please contact ESPP info@phosphorusplatform.eu

Public consultation: standards for FPR soil improvers and growing media

CEN has opened public consultation on 21 new or updated EU Standards relevant for FPR soil improvers and growing media, including methods for determination of pH, moisture, organic content, nutrients ... The draft standards are not freely available (as usual with CEN) – stakeholders should contact their national Standards Organisation. The list of Standards currently Under Enquiry is published by Technical Committee [CEN/TC 223 Soil improvers and growing media](#). Deadlines range from late December 2025 to January 2026

CEN/TC 223 <https://standards.cencenelec.eu/dyn/www/f?p=205:22:0>

Further information: Lara.vanderWoude@nen.nl

ESPP input to EU consultation on food and feed regulations

ESPP input to EU consultation preparatory to ‘omnibus’ (simplification) on Food and Animal Feed regulations regrets absence of consideration of circularity and calls for review to enable nutrient recycling whilst ensuring safety. The ESPP input suggests that the EU Animal By-Product Regulations, TSE Regulation and animal Feed Regulation should be reviewed to facilitate recycling, in particular by simplifying and harmonising ‘End-Points’ between different regulations (ABP, Waste ...), reducing complexity, rationalising the EFSA (European Food Safety Agency) evaluation process, remove the exclusion of mineral nutrient salts recovered from certain wastes of the Animal Feed Regulation (where quality and safety are ensured).

ESPP input to [EU public consultation](#) on “Food and feed safety – simplification omnibus”, 14th October 2025
www.phosphorusplatform.eu/regulatory

ESPP input to EU consultation on “Green Listing” of wastes

ESPP proposes that secondary nutrient wastes (Ashes, Secondary Fertilisers, Bio-Based Streams, Nutrient-Rich Process Streams) should be exempted from waste transport declarations and/or be eligible for harmonised criteria (see details in [ESPP eNews 99](#)). ESPP noted that transboundary shipment of secondary nutrient materials can be complex or prohibitive. These materials are often classified as “waste” in some Member States (often not consistently between different Member States). Because they are bio-based, these secondary materials are variable, maybe seasonal, often in small and locally disperse quantities, all of which can make documentation complex and disproportionately expensive. Operators, often in agriculture or wastewater sectors, may not be equipped to deal with international waste declarations. Secondary nutrient materials are often ‘organic’ (containing organic matter) so bulky and susceptible to decompose, so that transport cannot wait until documentation proceeds. For these reasons, ESPP suggests that ‘Green Listing’ of the following wastes would be important to facilitate nutrient recycling and the bioeconomy, on condition that they are destined for nutrient / mineral recovery:

- Ashes: Sewage sludge incineration ash, Biomass combustion ash, Municipal solid waste incineration ash destined for minerals recovery, Cat.1 Animal By-Product incineration ash;
- Secondary Fertiliser Materials: EU Fertilising Product Component Materials, Materials which are authorised for use as ‘National’ fertilisers in the recipient Member State;
- Bio-Based Streams: Materials from processing of plant materials (from production of human foods or animal feeds, bio-fuels, bio-materials, biochemicals, biofibres and from biorefineries), Aquaculture sludges;
- Nutrient-Rich Process Streams: Fire extinguishers and wastes resulting from their refilling, Phosphorus-containing metal processing liquors and ‘spent’ phosphoric acids, Batteries and battery processing wastes including black mass, Nitrogen salts and solutions recovered from gas-stripping.

ESPP estimates, for each proposed stream, the European potential for nutrient recovery (P, K, N)

ESPP input submitted to the consultation www.phosphorusplatform.eu/regulatory

EU public consultation (closed 31st October 2025) “Green-listing certain waste for the purposes of shipments to recovery between Member States” https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14712-Green-listing-certain-waste-for-the-purposes-of-shipments-to-recovery-between-Member-States_en

EU Fertilising Products Regulation (FPR)

European Commission webinar on Fertilising Products Regulation (FPR) ‘Evaluation’

Wide stakeholder participation to webinar organised to input to the FPR official Evaluation shows stakeholder frustration with cost, complexity and excluded secondary input materials and low uptake of FPR for recycling. Over 300 stakeholders joined this webinar organised by the consultants leading the Evaluation for the European Commission. This follows over 100 inputs received to the [EU public consultation](#) (see [ESPP eNews n°100](#)). The consultants estimate that fertilising products represent c. 0.17% of EU GDP and that the market for organic fertilisers is around 1.1 billion €. However, based on numerous interviews with stakeholders, the consultants estimate that for both organic and organo-mineral fertilisers, as well as for growing media, less than 5% of products today placed on the market in Europe are FPR CE-Mark: nearly all continue to use Member State national regulations. Reasons identified for this low uptake of the FPR include its complexity, the cost of CE-Mark certification (in particular if companies have already paid for national fertiliser or waste regulation certification) and the fact that many Animal By-Products are still excluded from the FPR (“processed manure” was included into CMC10 in 2024, see [ESPP eNews n°88](#)). Some stakeholders noted that the FPR can be long-term cost-advantageous, because one FPR CE-Mark certification is cheaper than several national certifications, and because the CE-Mark is now recognised by customers both in Europe and for export outside the EU. ESPP underlined that the FPR opens the European market for nutrient recycling processes, by defining recognised product criteria, and suggested that the Evaluation should lead to reorientate FPR input specifications for secondary materials (CMCs) towards ensuring quality and safety (rather than being based on material origin), and that CMCs should be widened and more flexible to allow all non-contaminated materials for biorefineries, to reflect the rapid innovations in the bioeconomy and in nutrient recycling, and that secondary material streams are often locally specific, evolve over time, relatively small and diffuse flows.

European Commission, EU Fertilising Products Regulation ‘Evaluation’ https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14365-Fertilising-Products-Regulation-evaluation_en

ESPP input to the FPR Evaluation www.phosphorusplatform.eu/regulatory

DCM CE-Mark organo-mineral fertiliser

Belgian fertiliser company De Ceuster Meststoffen nv (DCM) launches DCM ECOR®6, an EU FPR Certified (CE-Mark) fertiliser, authorised for use in Certified Organic Farming, based on plant materials and natural mineral materials. The fertiliser is micro-granulated NPK 5-2-4.5 plus calcium, magnesium and sulphur. It does not contain animal by-products nor manure-derived materials. The nutrients come from a combination of plant-derived materials and ground phosphate rock. The fertiliser is CE-Mark Certified under Module B as PFC1(B)(I) Solid Organo-Mineral Fertiliser NPK (a coformulation of an inorganic fertiliser and materials containing both organic carbon and nutrients of biological origin), and contains CMC1, CMC2 and CMC6 as component material categories (CMCs). It is authorised for use in Certified Organic Farming in the EU (2018/848, certified by FiBL Germany, Dutch Input List, Easy-Cert Austria and Control Union). The organo-mineral fertiliser claims to deliver progressive nutrient release and to stimulate soil microbial activity by providing organic carbon, so improving plant nutrient uptake. The FPR CE-Mark is presented as streamlining administrative requirements for distributors across Europe and enabling use in CE-Mark Blends (PFC7), such as potting soils.

“DCM ECOR® 6: CE certified fertiliser for easier access the EU”, DCM <https://dcm-info.com/innovations/ecor-6-ce-certified-fertiliser-for-easier-access-across-the-eu>

DCM ECOR®6 product technical information and Fact Sheet <https://dcm-info.com/products/fertilisers/dcm-ecor-6>

Suez obtains FPR CE-Mark for digestates

Suez (ESPP member) Terres d’Aquitaine (Saint-Selve, France) solid digestate from around 50 000 t/y biowaste and agricultural crop wastes is now FPR CE-Mark Certified by Eurofins as an Organic Soil Improver PFC3(A). The site produces methane (injected into natural gas network) and also ammonium sulphate solution (liquid nitrogen fertiliser certified under French fertiliser regulations), recovered industrial-grade water, and captures the CO₂ from the digesters for use in agricultural and industrial applications. The biowastes treated include organic and food wastes from restaurants and household separate collection. Around 9 000 t/y of centrifuged solid-fraction digestate (20 – 25% DM) are being CE-Mark certified annually and sold to farmers in the region. The biowaste is classified as an Animal By-Product (households and restaurants discard meat wastes in food wastes) and has full traceability



from the producer to the digester, where ABP Regulation sanitisation is ensured as per EU 142/2011 (as required for use in an EU fertilising product). Suez notes that benefits of the CE-Mark certification include ensuring End-of-Waste Status more clearly than under French fertilisers regulations and administrative and commercial recognition. In an interview for EBA (European Biogas Association), Suez indicates that the cost of the CE-Mark certification is around 6 000 €/y, including required sample analysis, and that this is expected to be economically justified.

“Terres d’Aquitaine. SUEZ repousse les limites de la valorisation des déchets organiques et produit de nouvelles ressources pour les territoires”, Suez press dossier June 2025 https://www.suez.com/-/media/suez-global/files/press-release/pdf-francais/suez-tda_dossierpresse-06-2025_v6vdef.pdf

“Digestate Certification with SUEZ!”, EBA Newsletter, September 2025 <https://www.europeanbiogas.eu/digestate-certification-with-suez>

ESPP Members

10th Anniversary of the German Phosphorus Platform (DPP)

A decade of commitment to phosphorus recovery and sustainable nutrient management. DPP’s annual Forum, saw Federal and Land governments confirm the need to implement Germany’s legal 2029 sewage P-recovery obligation.

110 participants, 8th – 9th October 2025, Frankfurt, discussed status of the German P-recovery legislation, developments in P-recovery technologies and future strategies for sustainable nutrient management. The German Federal Ministry for the Environment (BMUKN) and the responsible LAGA working group underscored that there is no alternative to achieving the legal phosphorus recovery requirement by 2029. P-recovery costs can be passed on by water companies/authorities in water fees (see UBA report in [ESPP eNews n°100](#)). This can significantly reduce the financial burden on wastewater treatment plant operators, who might otherwise bear the full cost of recovery processes.

DPP presented the winner of its 2025 €1,000 Sponsorship Award for Annika Anders’ [dissertation](#) on “Phosphorus Release and Recycling from Activated Sludge in Large Wastewater Treatment Plants.”

The DPP Forum included a site visit to the [UPhO GmbH installation](#) in Michelstadt, Hesse, where up to 20 000 t/y of dried sewage sludge will be thermochemically treated in a rotary kiln, with the aim of generating a fertilising product (further details to be published soon).

After thanking Simone Apitz who has chaired DPP for the last six years, DPP elected its new Board: Daniel Frank, independent communications consultant, Chairman, Herbert Hochgürtel, Wirtschaftsbetrieb Mainz AöR, Diedrich Steffens, University of Gießen, Simone Apitz, Hessian Ministry of Agriculture and Environment, Rudolf Turek, MSE, Dieter Leimkötter, sePura.

Photo: DPP’s new Board, October 2025. DPP German Phosphorus Platform <https://www.deutsche-phosphor-plattform.de/>



CiNURGi

The CiNURGi EU-funded Intereg project aims to recycle nutrient-rich biomass from agricultural, municipal, and industrial sources into safe fertilisers, and provide authorities with roadmaps to facilitate reducing nutrient losses.

Interreg
Baltic Sea Region



Co-funded by
the European Union

CiNURGi
CIRCULAR ECONOMY

The 3-year project, ending in October 2026 is funded by Interreg BSR (Baltic Sea Region) and lead by RISE. The consortium consists of 24 partners in Sweden, Denmark, Estonia, Finland, Germany, Lithuania, Latvia and Poland. CiNURGi will promote the use of recycled nutrient fertilisers, with the intention of being able to replace the use of mineral nutrient fertilizers with recycled nutrients. To achieve this, we will draft safety and quality standards for recycled nutrients and develop strategies

for using nutrient recycling to address regional nutrient imbalances in the Baltic Sea Region. We will also promote the development of markets, to increase the production of recycled nutrients. Finally, CiNURGi will contribute to HELCOM Baltic Sea Action Plan and the planning and implementation of nutrient recycling measures. By joining ESPP we hope to join a community curious about nutrient recycling, especially phosphorus, interested in taking part of our project results.

Read more about the project: CiNURGi - Interreg Baltic Sea Region <https://interreg-baltic.eu/project/cinurgi/>

Policies for nutrient management

Deloitte study: “demand-side mandates” to support EU industry, including fertilisers

Deloitte report assesses the potential role of “demand-side mandates” – for example, quotas requiring an increasing share of sustainable materials in certain products – to strengthen EU industry and support strategic autonomy. The report “Mobilizing consumer demand for sustainable investments” (September 2025), examines how EU policies could help energy-intensive industries (such as fertilisers, chemicals, steel and refining) invest in low-emission technologies.

According to the report, current energy costs and carbon policies have not led to large-scale adoption of low-emission production in Europe. Instead, they have contributed to plant closures and the relocation of production – and associated carbon emissions – outside the EU. In the past three years, around 30 industrial plants have closed in Europe, including five fertiliser facilities. Nitrogen fertiliser production costs are estimated to be up to 2.5 times higher in Europe than in Russia, mainly due to higher gas prices and Emissions Trading Scheme (ETS) costs. The report also notes potential challenges in the Carbon Border Adjustment Mechanism (CBAM), such as possible “emissions shuffling,” its limited coverage of finished goods (e.g., cars made from imported steel), and the lack of compensation for EU exporters.

Transitioning to low-carbon technologies across the four sectors studied would require about €150 billion per year – a scale unlikely to be met by industry margins or public subsidies alone. For fertilisers, sustainable production could cost up to 3.5 times more than conventional methods. At the same time, **if these costs were passed on to end products, such as food (for fertilisers), the impact would be much less significant: between 0.3% and 1.8% of consumer prices** in the examples analysed.

Developed with input from over 60 stakeholders – including energy and chemical producers, industry associations, regulators, and downstream users – the study reflects broad concern about industrial competitiveness and carbon leakage. Stakeholders point to the need for a comprehensive policy mix, combining supply-side measures, improvements to the CBAM with targeted demand-side mechanisms that would create lead markets for sustainable products and give producers the certainty needed to invest.

For the fertiliser sector, the report discusses how mandates could potentially be linked to downstream markets such as dairy, meat, eggs, and grain-based products, which together account for roughly two thirds of fertiliser use. Possible approaches could involve applying quotas, for example to food retailers, or dairy companies.

Finally, the study proposes a framework to guide further work on demand-side mandates – covering areas such as target markets, design principles, metrics, compliance, and governance – and calls for structured stakeholder engagement and policy coordination at the EU level.

Importantly, the report does not propose adding new layers of bureaucracy. Rather, it notes that **well-designed demand-side instruments could replace or streamline existing mechanisms, potentially simplifying reporting and compliance for participating industries.**

The report was commissioned by the Netherlands Government Investment Agency, the Dutch chemicals and fertiliser federations, and several energy companies and institutes.

“Mobilizing consumer demand for sustainable investments: Potential role of demand-side policies to stimulate investments in more sustainable products and strengthen European heavy industry”. Deloitte, September 2025 <https://www.nvde.nl/wp-content/uploads/2025/09/EU-Demand-Creation-Deloitte-Report.pdf>

US: legal actions on PFAS pose questions for sewage sludge valorisation to farmland

In the USA, political action is blocking EPA work on PFAS in “biosolids” (sewage sludge), the threat of legal actions by NGOs and farmers poses challenges for ongoing use as an agricultural fertilising product. [Media](#) indicate that a Republican proposed amendment to the 2026 budget would block any use of EPA (US Environmental Protection Agency) funds for work on PFAS, thus preventing the EPA from finalising the draft impact assessment of PFAS and PFOA in sewage sludge published early 2025 (see [ESPP eNews n°95](#)) and from taking any consequent regulatory action. Also, it is [reported](#) that a judge has blocked a legal case brought by farmers on PFAS in biosolids in Texas, without consideration of the case substance. This case, brought by NGOs and farmers’ organisations, accused the EPA of failing its duty to prevent toxic chemicals in biosolids based fertilisers. A lawsuit brought by five Texas farmers against a waste and water management company (Synagro) is pending. The farmers claim that biosolids fertilisers containing PFAS have contaminated their land and downstream water. Synagro claim that PFAS levels found are similar to natural levels except for one short-chain compound (perfluoropropanoic acid PFPrA) and that there is no evidence to link PFAS found to those in the biosolids or their breakdown products. Some US States have enacted measures on PFAS: Maine and Connecticut have banned land application of biosolids and a ban is also [being debated](#) in Massachusetts, Michigan has implemented PFAS limits for biosolids applied to land and other States require PFAS testing in sewage sludge.

A recent study ([Oviedo-Vargas et al. 2025](#)) comparing PFAS in soils for ten US farms, comparing fields with a history of biosolids application as fertilisers compared to fields on the same farms which had not received biosolids. The study found detectable levels of the 14 individual PFAS compounds sampled in samples for the biosolids-receiving fields compared to only one from non-biosolids fields, and generally higher levels of total-PFAS in biosolids receiving fields. Results varied with biosolids

supplier and with physicochemical properties of soils (e.g., organic matter and pH). On two farms with streams adjacent to biosolids receiving fields, PFAS were also found in the stream water. Soil concentrations of total-PFAS-PFOA found in the study were below 25 ng/g.

US EPA (Environmental Protection Agency) "Draft Sewage Sludge Risk Assessment for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS)", [ESPP eNews n°95](#)

Update on EU PFAS Restriction process [ESPP eNews n°100](#)

"Quantification of PFAS in soils treated with biosolids in ten northeastern US farms", D. Oviedo-Vargas et al., *Nature Scientific Reports*, 15:5582, 2025 <https://doi.org/10.1038/s41598-025-90184-z>

Report to UN Environment Assembly (UNEA) proposes actions on nutrient pollution

The UNEP Executive Director's preparatory report for UNEA 7, Nairobi, December 2025, proposes 'Tackling nutrient pollution' as one of five priority areas for action. UNEA Resolutions are proposed by member States and this report aims to inform these. This report examines emerging and urgent environmental issues that could be pertinent as Member States evaluate resolutions for potential adoption. The proposed priorities are water, nutrients, critical minerals (for renewable energies and digital technologies), the ozone layer and the stratosphere, and AI applications to environment. On nutrients, the report indicates that there is scientific consensus on the detrimental effects of nutrient pollution, but no global assessments of nitrogen or phosphorus in the environment, and no consensus on their impacts. It suggests that the UN could promote a coherent, system-wide approach to nutrient management – which is currently fragmented, integrating existing initiatives, including nutrient recycling and water treatment, with food system, soil health and climate benefits. This could build on the UNEP Working Group on Nitrogen, established following Resolutions at UNEA 4 and UNEA 5 (see [ESPP eNews n° 67](#)) The report suggests to widen this work to cover phosphorus and to establish a UN collaborative platform for knowledge exchange and joint actions on nutrient pollution and for sustainable nutrient and wastewater management.

"Priorities for advancing sustainable solutions for a resilient planet. Report of the Executive Director", United Nations Environment Programme (UNEP), 6th May 2025 <https://wedocs.unep.org/bitstream/handle/20.500.11822/47435/EDReport.pdf>

Seventh session of the United Nations Environment Assembly (UNEA-7), 8 to 12 December 2025, Nairobi, website <https://www.unep.org/environmentassembly/unea7>

Research

UK Water Industry Research pre-study on sewage sludge pyrolysis & HTC

UKWIR desk study concludes that ATC (Advanced Thermal Combustion) processes show promise for organic contaminant elimination but data is inadequate and inconsistent. An experimental assessment procedure is proposed. The desk study considers dry and wet ATC processes including pyrolysis, gasification, hydrothermal carbonisation, supercritical water oxidation. Literature data analysis concludes that data on fate of PFAS and microplastics in such processes is limited. Higher temperatures show increased depolymerisation or fragmentation of microplastics. Most studies do not provide useable information about fate of PFAS because of possible breakdown to non-assayed PFAS compounds, lack of gas-phase PFAS analysis (methods only developed recently) and absence of fluorine mass balances. No ATC technology is considered to give uniformly positive or negative results for studied contaminants, nor to show sufficient evidence to not warrant further trials. For pyrolysis (biochar processes), optimal temperatures for breakdown of microplastics is estimated to be 450°C and for PFAS to be 700°C. The report also notes questions concerning requirements for offgas emissions abatement for different ATC technologies (*ESPP note: this concerns whether or not Industrial Emissions Directive offgas treatment would be required, implying significant investment and operating costs and energy and chemicals consumption*) and indicates clarification of this regulatory question as priority for assessing the LCA of the processes. Given the lack of consistent data and the limited options for testing in full-scale installations, the report recommends further laboratory and bench scale testing of the different ATC processes, to analyse breakdown and fate of microplastics and PFAS.

"CIP4 Microplastics and Advanced Thermal Conversion (ATC) Phase 1", UKWIR (UK Water Industry Research, the UK water industry's collaborative joint research organisation, an ESPP member), Report Ref. No. 25/EQ/01/36, 39 pages, 2025 <https://ukwir.org/project-reports?object=402479>

Italian survey of aquaculture operators on circular economy

Operators are aware of circular economy principles but relate this to environment and not economic savings, considering waste management costs not significant. Smaller operators see regulatory and technical barriers.

The survey was sent to the 220 members of the Italy Aquaculture Association, covering marine and freshwater fish and shellfish farmers and related professionals (e.g. veterinarians) and resulted in over 100 responses (47%). Trout are the most important product (30% of respondents), followed by sea bass and mussels (both < 10%). Of different circular economy practices, only the reduction of conventional feeds is widely practiced (53%), with 18% implementing water recycling (mainly in freshwater farms) and 12% recycling wastewaters as biofertilisers. Overall respondents tend to see circularity as necessary for the development of

agriculture with some potential for increasing the sector's performance, but show little knowledge of possibilities or technologies for waste valorisation and see regulation and bureaucracy as important barriers.

"Circular economy in aquaculture: An Italian survey to understand perceptions, challenges and options for transition", M. Cozzolino et al., *Marine Policy* 176 (2025) 106660 <https://doi.org/10.1016/j.marpol.2025.106660>

Why do farmers overapply phosphate fertiliser ?

Survey of North Carolina farmers shows most respondent farmers are consistently applying phosphate fertiliser above recommended rates and are applying P when soil test results indicate that it is not needed. (Kile et al. 2025) 122 farmers, mainly from large farms in the coastal plain, growing maize, soy and wheat responded to a questionnaire (total 19 questions) circulated by growers' associations. This is not due to knowledge gaps nor lack of interest, as 99% of respondents carry out soil P testing. Although manures have contributed to accumulation of high soil P levels in North Carolina, manure and other organic fertilisers played a minor role on the farms responding to this questionnaire. A majority of the farmers responding indicated that they apply fertilisers at rates different from soil test report recommendations, with the variation often based on their "own experience". Nearly 2/3 of farmers apply some P fertiliser when the soil test results indicate that none is needed. These results are consistent with previous findings of certain of the authors (Osmond et al. 2015, also in North Carolina). Nearly 40% of respondents stated that they had seen crop P deficiency symptoms when P fertiliser was not applied. The authors note that over-application compared to recommendations is of particular concern as the official recommendations already include a margin of over-estimation, to avoid risk of under-fertilisation. Most of the respondent farmers indicated that they did not modify their P application rate with the 2021-2022 P-fertiliser price spike. Possible reasons for the consistent over-application of P fertiliser include farmers considering that higher application may result in higher yields, especially if weather and soil conditions are positive (see also Sheriff 2005), use of "starter P" fertiliser as a standard (despite this is not needed), and use of identical P application rate across all fields for reasons of time saving and equipment set-up (irrespective of different soil test results). The authors conclude that most surveyed farmers are consistently over-applying phosphate fertiliser for reasons of risk-aversion, adding an additional 'buffer' dose on top of official recommended rates which already include a 'buffer', and that this is not due to lack of information or soil data.

Survey of Michigan maize farmers shows 29% of respondent farmers overapplying phosphate fertiliser. These farmers showed above average crop yield, and expressed higher concern about profits, productivity and P-losses. (Sarkar et al. 2025). This survey collected responses from 1650 Michigan corn farmers (30% response rate), so (as above) responses may represent how farmers wish to present themselves rather than reality. 88% of respondents regularly soil test. The farmers over-applying P fertiliser indicated (statistically significant) higher levels of concern about yield risk and soil productivity, less importance given to information from their family and (counterintuitively) higher concern about phosphorus losses. Only one third of over-applying farmers had received recent (< 5 years) information on crop P response (2/3 for non over-applying farmers), and over-applying farmers expressed interest in agricultural practices to reduce nutrient loss, suggesting that in this case information via fertiliser distributors, consultants and extension services could reduce over-application.

Targeted survey of 900 selected farmers around Qingdao, China, showed that 'social capital' (information networks) significantly contributed to P-fertiliser use reduction for all farms, and technology knowledge also for larger farms. (Zheng S. et al. 2022). The study methods are based on a literature search on farmers behaviour and chemical fertiliser application reduction and a theoretical framework. The study then defined a representative sample of 900 farmers across 35 representative villages around Qingdao, a region which has a green agriculture and fertiliser adjustment policy since 2020. 889 questionnaires were retrieved from the 900 selected farmers. Conclusions are that 'social capital', covering information sources such as family, farmers' cooperatives, agricultural associations, has the strongest impact and statistically significant correlation to fertiliser use reduction for all farmers, small and large. Technology knowledge shows correlation with 'part time' farmers and larger farms, confirming results of Ma W. & Zheng H. 2022 which showed that technology uptake (such as mobile phone) reduced fertiliser application.

"Why Does Overapplication of Phosphorus Fertilizers Occur: Insights from North Carolina Farmers", L. Kile et al., *Agriculture* 2025, 15, 606, [DOI](#).

"Phosphorus application rates and farmers' perceptions of environmental concerns", S. Sarkar et al., *Agric Environ Lett.* 2025; 10:e70014, [DOI](#).

"Factors influencing the farmer's chemical fertilizer reduction behavior from the perspective of farmer differentiation", S. Zheng, K. Yin, L. Yu, *Heliyon* 8, e11918, 2022, [DOI](#).

"Heterogeneous impacts of information technology adoption on pesticide and fertiliser expenditures: Evidence from wheat farmers in China", W. Ma & H. Zheng, *Australian Journal of Agricultural and Resource Economics*, vol. 66, Issue 1, 2022 [DOI](#)

ESPP members



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