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### Background

This document contains information on ongoing activities and projects on efficient phosphorous (P) recycling promoted by research at MTT Agrifood Research Finland.

### Action required

The Meeting is invited to take note of the information and make use of it as appropriate.

## Efficient P recycling as promoted by research at MTT

To improve water quality of the Baltic Sea, phosphorus (P) leaching from agriculture in the BSR should be markedly reduced. This can be achieved when soil P levels and P fertilization are adjusted to meet plant need by avoiding over-fertilization that is typical in areas of intensive animal production.

In general, P load from agriculture can be reduced by practices that aim to close the leaking P cycle in the catchment areas. This means that P containing materials such as manure or sewage sludge (SS) are used efficiently as P sources. However, in intensive animal production areas, where large amounts of manure are produced, P leaching is high due to the past and present manure inputs that have raised the soluble P level in soils. E.g. in Finland, half of the fields have such a high P level that P fertilization is unlikely to provide yield response, according to the **BALTIC MANURE** research project (with 18 partners covering different countries in BSR). Manure P content alone would be enough for plant P requirement for the whole Finnish plant production, with no need for mineral P fertilizer, if manure was spread to areas with actual need for P. This optimal situation would decrease the total use of P in agriculture and lower high soil P levels.

It is most important that P recycling is improved by developing methods for manure processing and thereby making P transportation economically viable. Moreover, all potential P containing materials need to be considered as P sources in plant production. To adjust the P cycle, present soil P levels need to be taken into account when planning the actions.

On-going **PROMISE** research project (funded by BONUS-program with partners from Germany, Sweden and Finland) concentrates on different types of processing methods, e.g. anaerobic digestion and incineration, and there the contents of pathogens, antibiotics and heavy metals in differently processed SS and manures are analyzed. Moreover, we measure P solubility in the materials. Sewage sludges (SS) are poorly utilized in plant production, mainly due to uncertainty of the fate of organic pollutants after land application. Also uncertainty of P availability to plants restricts efficient use of SS. Economical and environmentally sound use of SS warrants efficient long-term utilization of SS based P while the risks of possible bioaccumulation of organic pollutant into the food chain must be evaluated. This aspect is planned to be studied in a future national project (**PProduct**, "Potential of sewage sludge phosphorus in plant production and impacts on environment and food chain"; research plan submitted by MTT to the Ministry of Agriculture and Forestry).

**BALTIC PHOENIX** "Sustainable recovery and recycling of nutrients – safety and efficacy for clear Baltic waters" is a project candidate aiming to the first call of the Interreg Baltic Sea Region Program opening in December 2014. The need for the project rises from the outcomes of the previous BSR projects (e.g. BALTIC MANURE), which showed that the nutrient-rich by-products, such as manure and SS, tend to concentrate spatially e.g. in intensive animal production areas or in the vicinity of biogas plants, leading to accumulation of nutrients into the agricultural soils and thus, causing elevated risk for nutrient leaching to waters. The project aims to effectively improve the nutrient cycling in the BSR, enhance development and implementation of nutrient recycling technologies as well as establishment of markets for recycled fertilizers. Project will emphasize cross-sectoral dialogue to realize sustainable use of urban and agricultural nutrient rich materials in the Baltic Sea Region. As a consequence, excessive soil nutrient content will be mitigated, nutrient leaching reduced permanently and hence, the quality of the Baltic Sea will be improved.

To gain synergy, BALTIC PHOENIX merged together two Seed Money Projects (Circunuts, PA-Agri and Baltic-P, Nordic Council of Ministers). BALTIC PHOENIX project candidate has partners from Finland, Poland, Denmark, Estonia and Sweden. Further negotiations are in progress. Contacts for more information are [Kimmo.rasa@mtt.fi](mailto:Kimmo.rasa@mtt.fi), [tapio.salo@mtt.fi](mailto:tapio.salo@mtt.fi).