

## TRAINING MATERIAL

### Title:

Liquid ammonium sulphate or ammonium nitrate from digestates and slurries stripped and scrubbed with  $H_2SO_4$  or  $HNO_3$  by "Circular Values" process (ID: 266)

### Training:

#### What is the product?

Ammonium sulphate/nitrate is a high N/NS containing liquid and transparent effluent from chemical air scrubber.

#### Who is the vendor of the product/technology?

The provider/vendor of the scrubbing technologies is Circular Values (<https://circularvalues.eu/>). Circular is an innovative Dutch company active in the business of upgrading agricultural residual products. Particularly in the supply of turn-key installations, concepts and offering process guidance relative to refining waste streams into useful nutrients and/or fibres.

#### Which other product/technologies are provided by the vendor?

Circular Values offers several types of N refining units alongside waste water or dewatering treatment units.

#### Which are the advantages of the product and the problems addressed?

Circular Values claims the variety of possible input streams to be one of the advantages of the technology: manure and other slurries, digestates, discharge water,... all can be used in the stripping-scrubbing process to produce the ammonium sulphate or ammonium nitrate. Both are relatively high nitrogen (7 to 18%) fertilisers with 100% nutrient efficiency. The recuperated nitrogen fertilisers are free of pathogens, insect larvae and weed seeds. The ammonium nitrate or ammonium sulphate fertiliser resulting from Circular Values' technology is a competitively priced artificial fertilizer-like nitrogen fertilizer which can be applied similarly and at similar concentrations as the commodity fertilisers.

#### Which is the nutrient content of the product?

The nutrient contents are minimum 7% N and 7% S for ammonium sulphate, and 18% N (50% Ammonium-N and 50% nitrate-N) for ammonium nitrate. Nutrient availability is 100% (0% OM) and pH can be fairly low: 2-5.

**Which equipment and methods can be used to apply the product?**

These fertilisers can be used in arable land farming or greenhouses on crops such as grass, cabbage crops, lettuce, potato, onions, celery, leek, cereals, sugar beets, maize, etc. On arable land the products can be put together in the same concentrations as commodity fertilizers. This opens a broad market, as existing machinery can be used to spread these fertilizers e.g. classic sprinkler with nozzles. Alternatives are an optimised application through drag hoses or spoked wheel fertilization.

As ammonium sulphate and ammonium nitrate (drainage water chemical scrubbing) are corrosive, the necessary machine components are made of corrosion-resistant materials. Mixing with the soil provides the advantage of minimal risk of crop combustion and volatilization of the product. Furthermore, the soil also has a buffer capacity to neutralize the potentially low pH of ammonium sulphate and ammonium nitrate.

In order to make optimum use of its effect as a fertiliser, it is desirable to make the product very specifically available to the plant, either at the start of cultivation or in the form of additional fertilisation. In order to avoid any risk of crop 'burn' (seeds, plants,leafs) during the administration, especially in windy and sunny weather, new specific application techniques are used (cfr above). Additionally one may choose to fertilise only during cool weather, during or just after rain.

**How to use the product?**

The application dose depends (in general & in particular in Flanders) on type of farm, region (N), soil (P), on crop, etc.. Even the month of the year and the cultivation of catch crops influence the possibility to apply.

Ammonium sulphate and ammonium nitrate are good fertilizers particularly apt for alkaline soils. In the soil the ammonium ion is released and forms a small amount of acid, lowering the pH balance of the soil, while contributing essential nitrogen for plant growth. Ammonium nitrate is an important fertilizer because it contains both cation ( $\text{NH}_4^+$ ) and anion ( $\text{NO}_3^-$ ) nitrogen. As to ammonium sulphate, due to the decreasing sulphur deposition in the form of acid rain (linked to improved air quality), the provision of sulphur in the fertilisation schedule is recommended especially for crops with a high sulphur requirement (e.g. cabbages, leek,..). The sulphur content of ammonium sulphate is normally the limiting fertilization factor because an excess of S prevents the absorption of other minerals. Co-fertilisation with urean reduces the S content as the N content increases.

The most recent analysis values determine the maximum dose that can be used on agricultural land. It is strongly recommended to work also with a recent soil analysis. Based on soil type, the soil analysis results (N & S), the crop requirement, the corresponding fertilisation advice, etc. the correct dosage should be calculated. Commonly however the dosage often fluctuates between 500 and 1000 L/ha/y

**Which are the authority permits and in which EU countries?**

In Flanders these ammonia fertilisers require no certification, derogation, nor manure transport documents. In Holland also they can, conditionally, be traded as mineral fertilisers. On a European level the Nitrates Directive defines this product as animal manure and not as mineral N fertiliser yet. Therefore the product has to fulfil requirements of animal manure. A European project Safemanure is ongoing to attempt validation EU-wide as a mineral fertiliser.

**How much does it cost?**

The ammonium nitrate or ammonium sulphate fertiliser resulting from the Circular Values stripper-scrubber technology is a competitively priced mineral fertilizer with a cost ranging roughly between 0€/t to 15€/t.



For more information: [https://nutriman.net/farmer-platform/product/id\\_266](https://nutriman.net/farmer-platform/product/id_266)

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