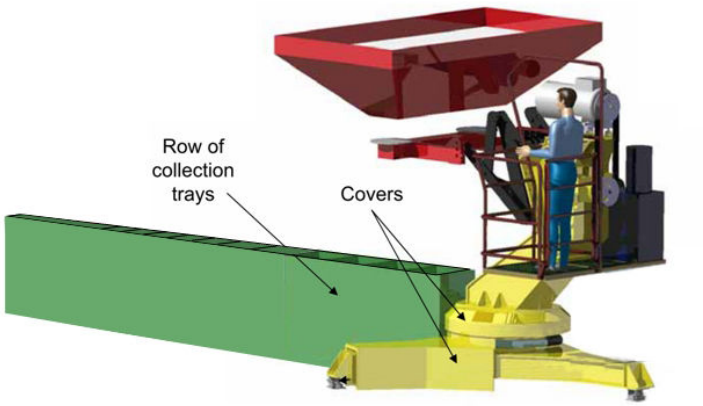
June 2013

Spreadability of Polysulphate ™ bulk-blended with Urea
Comparison with Ammonium sulphate - Urea bulk-blend

Material & Method



After a mathematical treatment of the data, figures are expressed in a classical Cartesian matrix. In addition to standard transverse curves parameters (spreading width, CV%), fundamental characteristic values (such as angular distribution and radial distribution) can then be assessed. Thus it possible to understand the behaviour of granules and to model optimum settings to get the maximum projection distance that complies with quality requirements (CV < 10%).

Granules distribution on the ground is dependant on

- physical properties of the fertiliser (bulk density, size distribution, flowability)
- mechanical settings of the spreader.

Thus ,for a given setting, two different fertilisers will give two different patterns (see Figure 1 as an example)

Polysulphate ™ blended with granulated urea have been tested for spreading performance with CEMIB ® . A comparison with traditional AS – Urea bulk-blend has also been performed as a reference.

CEMIB ® Spreading platform, launched in 2006 by Cemagref, measures the spatial distribution on the ground of centrifugally spread granular products.

One row of collection trays fitted with 80 load cells is placed radially to the spreader. The spreader spins on its own axis during spreading.

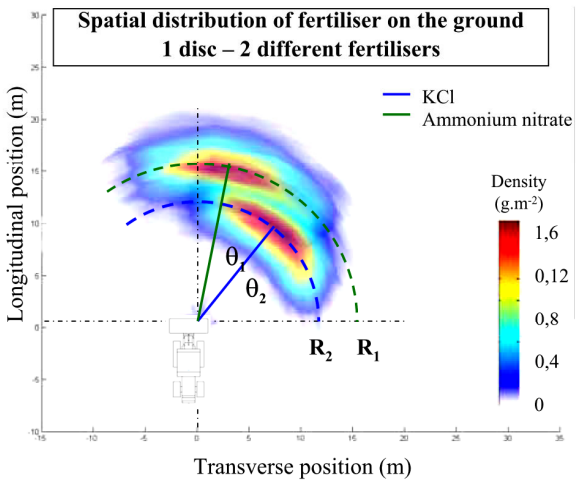


Figure 1 : Identical mechanical parameters, 2 different fertilisers : Ammonium nitrate , KCl

Main findings

Physical specifications of used products

	Bulk density [kg / dm³]	Mean diameter d_{50} (mm)	Range (mm) d_{90} -d_{10}
Polysulphate ™	1.43	3.39 mm	2.32 mm
Urea	0.74	3.25 mm	1.50 mm
Ammonium sulphate Granular3	1.03	2.61 mm	2.22 mm

The 3 products have different physical specifications :

1. Polysulphate and Urea have rather close mean diameters but their bulk densities are very different.
2. Granular3 and Urea bulk densities are more similar but mean diameters are different

Due to the variability of physical properties, specific settings are then required to optimize spreading performance.

Formulas obtained (composition expressed in N – P_2O_5 – K_2O – SO_3 - MgO) :

34% Polysulphate ™ - 66% urea : ***31 – 0 – 5 – 16 – 2*** (ratio N/SO_3 = 1.9)
34% Granular3 - 66% urea : ***38 – 0 – 0 – 20 – 0*** (ratio N/SO_3 = 1.8)

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Spreading of products in straight :

Maximum widths achieved : (CV<= 10%) :	
Polysulphate ™	42 m
Granular3	37 m
Granulated urea	40 m

Spreading of products in blend :

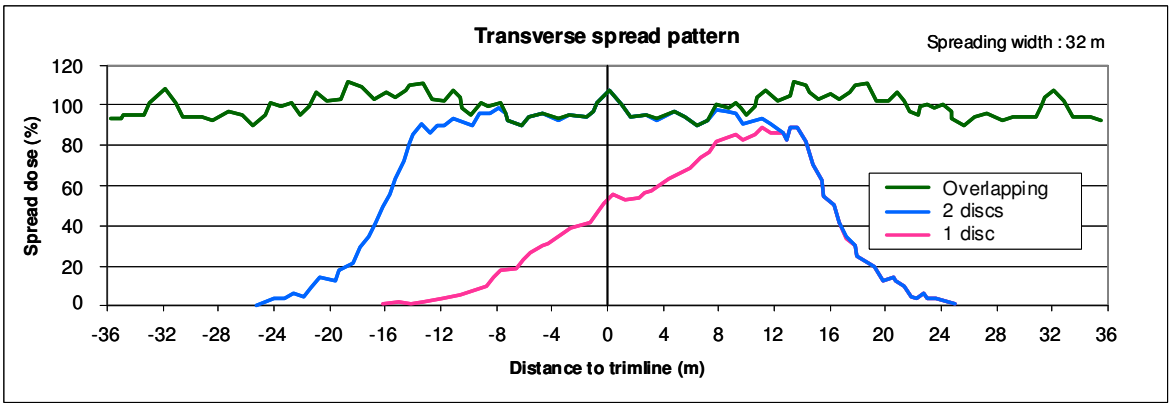
The use of appropriate settings makes it possible to achieve very wide spreading bouts, of more than 32 m, with Polysulphate ™ blended with granulated urea, with a coefficient of variation (CV) of less than 6%.

Maximum widths achieved :

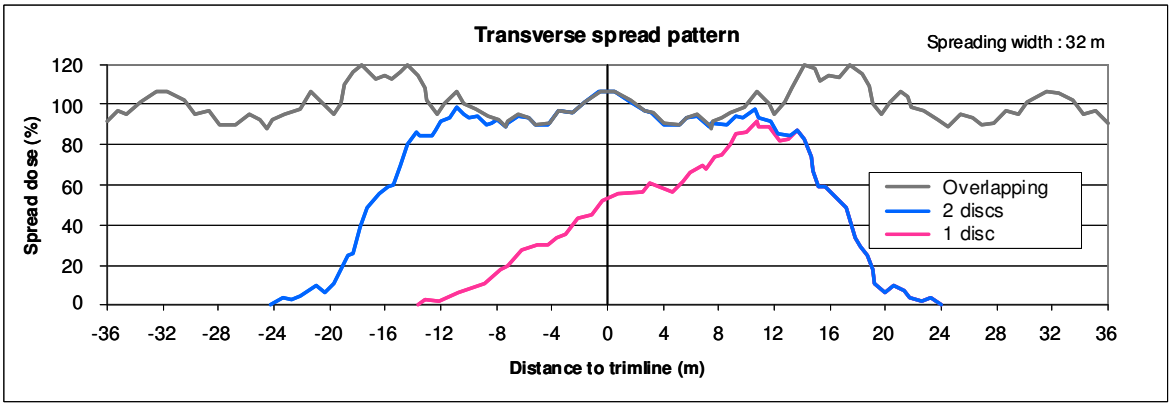
34% Polysulphate ™ - 66% Urea Bulk-blend	32 m	5.8% CV
34% Polysulphate ™ - 66% Urea Bulk-blend	35 m	(theoretical calculated width)
34% Granular3 - 66% Urea Bulk-blend	32 m	8.6% CV
34% Granular3 - 66% Urea Bulk-blend	35 m	(theoretical calculated width)

Beyond 35m no setting is possible to achieve an acceptable spreading with each blend.

Main charts



Spreading a blend of 66% Urea – 34% Polysulphate : 32 m width, CV 5.8%



Spreading a blend of 66% Urea – 34% Granular3 : 32 m width, CV 8.6%

Conclusion

Polysulphate ™ is suitable for arable crops fertilisation, it can be blended with granulated urea. The bulk-blend can be spread up to 32m bouts.

34% Granular3 - 66% Urea Bulk-blend performance is almost as good as
34% Polysulphate ™ - 66% Urea Bulk-blend

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