Spreadability of Polysulphate: straight and bulk-blended with CAN 27.

Material & Method

Polysulphate™ straight granulated form and Polysulphate blended with CAN 27 have been tested for spreading performance with CEMIB®. CEMIB Spreading platform, launched in 2006 by Cemagref, measures the spatial distribution on the ground of centrifugally spread granular products. Then a sophisticated model calculates a transversal spreading pattern and simulates best settings for the largest possible spreading width compatible with an acceptable precision.

Instead of an evaluation of the distribution in a Cartesian coordinate system, CEMIB® uses continuous weighing in a polar measurement system, which allows the evaluation of the spatial distribution on the ground of a fertiliser.

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. 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).

Main findings

Due to its specific properties (bulk density = 1.47 kg/dm³), Polysulphate requires specific settings to optimize spreading performance.

However, though projection range and horizontal outlet angle are very different from those of CAN (similar situation to the one illustrated on figure 1 above), a bulk-blend composed of CAN and Polysulphate behaves similarly to straight Polysulphate. Thus, results obtained with a 40% Polysulphate – 60% CAN 27 blend (present experiment) can be generalised to other similar blends (e.g. 30% Polysulphate – 70% Nitrogen).

Example obtained using a RAUCH AXIS 50.1 W spreader with S10 vane optimized to get the largest spreading width:

<table>
<thead>
<tr>
<th></th>
<th>Projection range</th>
<th>Horizontal outlet angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polysulphate: straight</td>
<td>18.7 m</td>
<td>60°</td>
</tr>
<tr>
<td>Polysulphate: bulk-blend</td>
<td>18.6 m</td>
<td>52°</td>
</tr>
</tbody>
</table>

Figure 1: Identical mechanical parameters, 2 different fertilisers: Ammonium nitrate, KCl
The use of appropriate settings makes it possible to achieve very wide spreading bouts, of more than 40m, with Polysulphate™, straight or blended with CAN nitrogen, with a coefficient of variation (CV) of less than 10%.

Maximum widths achieved:

<table>
<thead>
<tr>
<th></th>
<th>Width</th>
<th>Coefficient of variation (CV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polysulphate, straight</td>
<td>41 m</td>
<td>9.6%</td>
</tr>
<tr>
<td>Polysulphate + CAN Bulk-blend</td>
<td>41 m</td>
<td>8.7%</td>
</tr>
</tbody>
</table>

Main charts

Spreading straight Polysulphate: 32 m width, CV 4.3%

Spreading a blend of 60% CAN 27 – 40% Polysulphate: 30 m width, CV 6.6%

Spreading a blend of 60% CAN 27 – 40% Polysulphate: 41 m width, CV 8.7%

Conclusion

Polysulphate™ is suitable for arable crops fertilisation, as a straight or blended with CAN 27, on large farms equipped with very wide bout-width spreaders.

™ ‘Polysulphate’ is a Trademark of Cleveland Potash Limited