Spreading accuracy of two NKS-bulk blends applied by centrifugal spreader

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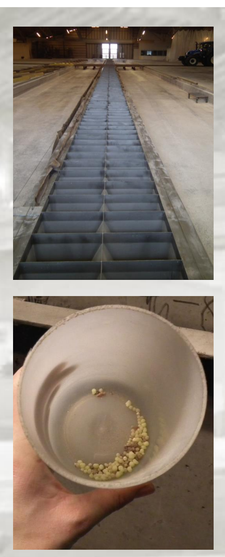
Problem

Fertiliser components in bulk blends have varying properties (e.g. shape, grain size) that can lead to differing spreading characteristics. In the 3-year R&D-project "OptiBlend" we intend to develop a smartphone app that helps farmers to adjust their centrifugal spreader to obtain best spreading results and to support fertilizer blenders to optimise the selection of appropriate blend components. The app will be able to identify fertiliser particles by using image analysis. To get calibration data sets, bulk blend fertilisers were tested under controlled conditions in a spreading hall.

Methodology

- two NKS-bulk blends (13-18-5)
  - **A** 56 % Sulfan (ASN) + 44 % Korn-Kali (MOP, S as sulphate)
  - **B** 40 % KAS (CAN) + 46 % AS (ammonium sulphate) + 14 % Korn-Kali (MOP, S as sulphate)
- varied spreader settings (disc spinning speed, drop point)
- 3 runs per test
- centrifugal spreader Amazone ZA-TS (disc: TS3)
- 80 collectors (each 50 x 50 cm) for fertiliser rate measurement
- fertiliser samples from each collector for nutrient analysis



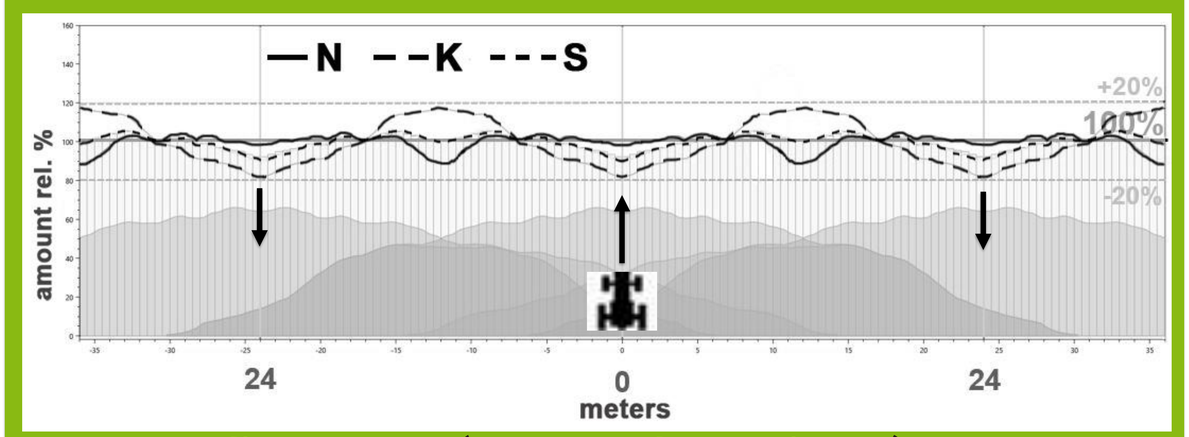
Results and Discussion

Blend A

Coefficients of variation (CV) for a working width of 24 m

spinning speed (rpm)	drop point	coefficient of variation (%) rate	N	K	S
720	**20**	**6.7**	**7.9**	**13.5**	**7.2**
720	30	8.8	6.3	16.7	9.8
720	40	12.5	8.7	31.8	14.0
900	20	7.8	11.8	8.0	7.3
900	30	4.8	16.3	18.1	4.8
900	40	5.8	20.3	15.4	5.0

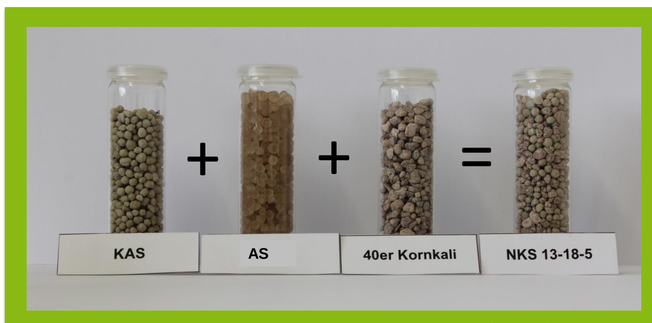
CV: < 10% good, < 15% acceptable (EN13739), > 15% not acceptable



24m-spreading pattern (720 rpm, drop point 20): rate, nitrogen (N), potassium (K) and sulfur (S)

- for all settings: application rate is passable (CV < 15%)
- K often shows distinct higher CVs than N and S
- spreading patterns for nutrients vary

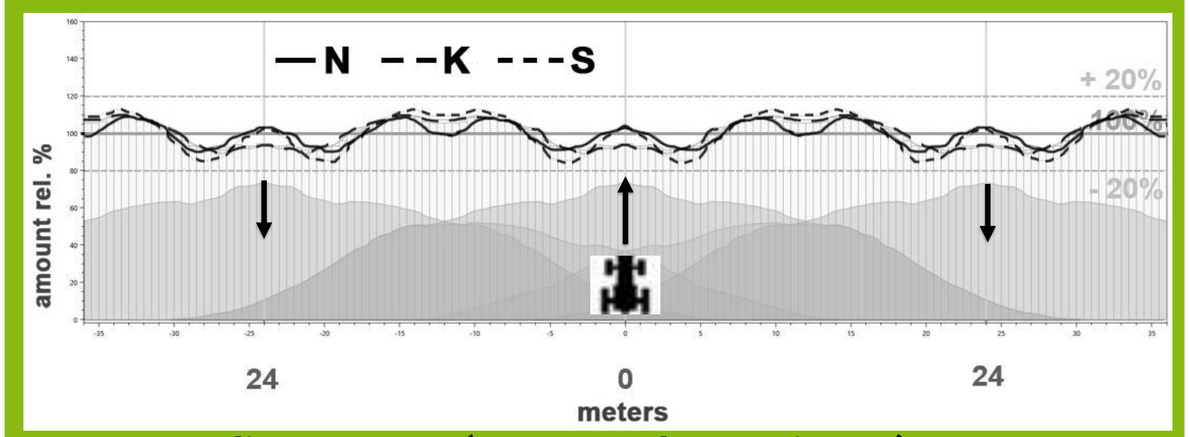
Blend B



Coefficients of variation (CV) for a working width of 24 m

spinning speed (rpm)	drop point	coefficient of variation (%) rate	N	K	S
720	**20**	**9.4**	**9.8**	**9.8**	**13.1**
720	30	12.6	17.8	8.0	12.6
720	40	21.3	11.2	31.9	19.8
900	20	5.3	5.0	7.5	8.6
900	30	5.4	7.3	7.4	8.3
900	40	5.9	9.6	13.5	10.0

CV: < 10% good, < 15% acceptable (EN13739), > 15% not acceptable



24m-spreading pattern (720 rpm, drop point 20): rate, nitrogen (N), potassium (K) and sulfur (S)

- most CVs are acceptable
- certain spreader settings result in unacceptably high CVs for N, K or S

Conclusion

For both bulk blends, spreader settings that lead to an acceptable distribution (CV < 15 %) of fertiliser rate and nutrients could be found. However, ultimately it could be argued that spreader settings should be primarily optimised for nitrogen as the most relevant plant nutrient.

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