Increased soybean yields with foliar applications of potassium nitrate based sprays

On behalf of the Potassium Nitrate Association (PNA), Landlab research company in Italy conducted a trial to study the effect of potassium nitrate (PN) based foliar applications on soybean growth and yield parameters. In this article, the focus will be on soybean yield only.

Trial set up

The effect of the treatments was tested in a completely randomized design with two factors:

1. Foliar treatments (Table 1).
2. K dose rate in basal dressing with KCl (Table 2).

In total, the trial consisted of 80 plots (4 K dose rates x 4 foliar treatments x 5 replicates). Plot size was 2,0 m x 1,5 m = 3,0 m^2.

Sowing of soybean with Rhizobium inoculum was carried out on the 27th of May 2015. Harvesting was done on the 20th of October 2015.

Foliar treatments were applied two times: at the growth stages V3 (Third node, 29th of June) and R3 (Beginning pod development, 28th of July 2015). Foliar application was done plot by plot at a spray volume of 600 l/ha.

Results

The average soybean yield was 4,5 ton/ha, which is in line with the soybean potential of the area.

Main effects on total yield were found for both the foliar treatments and for the K dose

rate in basal dressing. No statistically significant interaction (P=0,05) was found between the trial factors foliar treatments and basal dressing K dose.

Soybean yield was increased with 5% - 12% by two applications of the foliar PN based sprays, compared to the not foliar treated control. Foliar spray application of potassium nitrate (without addition of P source) resulted in the greatest statistically significant yield increase of 12%, followed by PN+MAP with 10% yield increase (Table 1).

Table 1. The effect of various foliar spray applications with potassium nitrate on soybean yield (MT/ha).

Foliar treatments*, applied twice: at growth stage V3 and R3	Soybean yield**	Soybean yield increase compared to the no foliar treatment	
	MT/ha	MT/ha	%
No foliar treatment (control)	4,2 a	-	-
PN 5 kg/ha/application + UP 3 kg/ha/application	4,4 ab	+ 0,2	+ 5%
PN 5 kg/ha/application + MAP 2,2 kg/ha/application	4,6 b	+ 0,4	+ 10%
PN 5 kg/ha/application	4,7 b	+ 0,5	+ 12%

*) PN = potassium nitrate; MAP = monoammonium phosphate; UP = urea phosphate.

**) Means followed by the letter same are not statistically significantly different (Fisher's protected least significant difference test at 5% level).

Increasing K dose in the basal dressing had a positive effect on soybean yield. Yield was statistically significantly higher (20% - 30%) at all doses of K compared to no KCl

application in the basal dressing (Table 2).

Table 2. The effect of increasing dose rates of K applied as KCl in basal dressing on soybean yield.

K dose in basal dressing as percentage of crop K-removal	Potassium chloride (KCl) applied at basal dressing	Soybean yield ^	Relative soybean yield increase compared to 0% treatment	
%	Kg K_2O/ha	MT/ha	MT/ha	%
0	0	3,8 a	-	-
40	40	4,6 b	+ 0,8	+ 20%
75	75	4,9 c	+ 1,1	+ 30%
100	100	4,7 bc	+ 0,9	+ 24%

*) Means followed by the letter same are not statistically significantly different (Fisher's protected least significant difference test at 5% level).