RESEARCH PROJECT – BPC and IPNI BRAZIL

RATES AND RESIDUAL EFFECT OF POTASSIUM FERTILIZATION IN A BRAZILIAN OXISOIL

RESULTS FOR SOYBEAN 2011-2012

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This Report

This report refers to the agronomic results for the crop of soybean 2011-2012 (second project year), and to soil test results for the crop season 2010-2011 (first project year). The research project is funded by BPC, coordinated in Brazil by IPNI Brazil, and has the field partner as Research Foundation MT.

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Introduction

The requirement for worldwide abundant food, feed, fiber, and more recently biofuel, leads to higher amounts of fertilizer utilized in agriculture in diverse parts of the globe. Potassium (K) is, most generally, the second nutrient in terms of plant demand (after nitrogen, N). Potassium is highly mobile in most soils and relatively mobile in the plants. This nutrient is responsible for several vital mechanisms for plant development and high yields (enzyme activation, translocation and stock of compounds, osmotic regulation, water maintenance, etc). Potassium fertilizers are very commonly a must in terms of plant nutrition in acid soils of the tropics, including Brazil. In many areas farmers are cutting back on fertilizer expenses, which could compromise good yields, profit and food safety in the future. Farmers expect that the soil supply will be sufficient to provide the ideal conditions for plant development and yield, even with lower or no supply of K fertilizers. Studying the impacts of K fertilizer cut back on Brazilian soils is essential as to demonstrate the effects in the medium to long run.

Objectives

The main objective of the study is to verify the effects of cutting back K fertilizer rates in some Brazilian soils. Also, it will be possible to study other important factors which may affect the K fertilizer effectiveness in tropical soils.

Material and Methods

A. General Information

The experiment takes place having soybean as the main crop and is located in Mato Grosso at the experiment station of Research Foundation MT. The K fertilizer used is KCl. The study is initially planned for six years. The winter crop will be defined locally. During the 2011-2012 season, a severe drought took place in November and postponed soybean sowing. Therefore, no second crop was utilized due to the late soybean harvest. The independent (input) variables studied will apply only to the soybean (summer crop). The soil is an Oxisol with the chemical and granulometric properties described in Table 1 (medium in K bioavailability).

Table 1. Chemical and physical soil properties prior to the trial establishment in 2010 (0 - 20 cm).

Soil		P	K	S	Ca	Mg	Al	H	V	OM	Clay	Sand	Silt
H_2O	$CaCl_2$	mg dm^{-3}				$cmol_c$ dm^{-3}			%	g dm^{-3}	g kg^{-1}		
5.6	4.9	20.4	57	18.6	2.9	0.7	0.0	5.4	41.0	38.9	639	152	209

Zn	Cu	Fe	Mn	B
mg dm^{-3}				
4.4	1.3	91	26.3	0.46

B. Treatments

The treatments are shown on Table 2 and legends for the variables studied can be found in Table 3. In summary the experiment outline proposes: (1) 4 rates of K in interaction with suppression or not of K after third year, (2) 3 rates of base saturation (BS), (3) 3 rates of phosphogypsum application (PG), (4) suppression of P in different levels after third year, (5) two levels of time of application, and (6) two levels of locality effect. The experiment is designed mainly to study K rates and its residual effect after the third year. Secondarily, the experiment is designed to evaluate other important variables that affect K fertilization, having the regular rate of K (K3) as a standard. The experiment will study the residual effect of K fertilization in interaction with liming and phosphogypsum. Also, the outline will make possible to investigate the phosphorus (P) residual effect and the effect of KCl, regarding time of K application and locality effect. Table 4 summarizes the variables studied. The regular practices in terms of rates, time of application, locality effect, liming and phosphogypsum application will be N3, P3, K3, TA1, LE1, BS L2 and PG L2. Nitrogen is of course not a problem for soybean (due to N fixation when seeds are properly inoculated with *Rhizobium japonicum*) and will not be studied. Variations in rates and other variables will permit several important comparisons as outlined in Table 5.

Some important local decisions related to the input variables for the treatments were made. They are:

1. *Rates of K_2O*: K3 was defined as 90 kg/ha. K_2O was applied in all treatments, except 23 and 24, by splitting the proper rate in two applications: half at seeding and half in top dressing right after plant emergency.
2. *Rate of N*: not applicable to soybean (inoculation).
3. *Rate of P_2O_5*: P3 was defined as 45 kg/ha P_2O_5.
4. *Lime rates*: Due to soil properties (pH H_2O 5.6) the decision was to start up the experiment by varying the rate only for treatments 14 and 15 (BS L3). These two treatments received 4.5 t/ha of dolomitic lime in 2010. All other treatments received no lime at any time.
5. *Phosphogypsum rates (PG)*: Similarly to the lime rates the decision was to start the experiment by varying the PG rates only for treatments 18 and 19 (PG L3). These two treatments received 2 t/ha of phosphogypsum in 2010. All other treatments received no phosphogypsum at any time.
6. *Time of application (TA)*: Regular TA was to regularly split the K_2O rates in two applications (half at seeding and half right after plant emergency). The alternative (treatment 23) was to split in three applications (1/3 at seeding, 1/3 at emergency and 1/3 fifteen days after emergency).
7. *Locality effect (LE)*: Regular LE was to apply half of the K_2O rate at seeding (5 cm besides and 5 cm bellow the seeds) and half in top dressing right after plant emergency. The alternative (treatment 24) was to apply all K_2O rate at the soil surface right after plant emergency.

The above mentioned decisions were based on soil, crop and regional knowledge at the region (previous agronomic experimentation). Soybean seeds used in 2011-2012 were TMG132.

C. Plots, replicates and statistics

The plot size (6.3 m x 9.5 m; 59.85 m^2) was planned as to permit future subdivisions in case necessary. This will allow new variables to be studied in case of interest. The number of replicate is four per treatment. The statistics will follow proper procedures as to allow the conclusions necessary for the study. For this season (2011-2012), statistics will be for the main output variables studied, i.e., **grain yield, K leaf content, soil K availability, weight of seeds, and plant height**.

D. Evaluations (Output variables)

(1) Soil K status with time. (2) Plant K status with time. (3) Weight of 1000 seeds, (4) Grain yield, (5) Plant height.

For soil test, samples were collected in number of 12 subsamples per plot (8 between plant lines and 4 on the plant line) from the first 8 inches of depth.

For grain yield, all soybean plants or maize ears were harvested out of a 3.6 m^2 area in two points of each plot.

For plant nutrient status, twenty random leaves of soybean or maize were collected at each plot.

For plant height, ten plants of soybean or maize of each plot were measured before harvest.

For seeds weight, five subsamples with 100 seeds each were weighed per plot after harvest.

Table 2. Experiment Outline.

Treat #	Treat #	Year (Rates of N)						Year (Rates of P_2O_5)						Year (Rates of K_2O)						Time App (TA)	Locality Effect (LE)	Liming BS Level	PG Level
		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6				
1	1	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	0	0	0	0	0	0	TA1	LE1	BSL2	PGL2
2	2A	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K1	K1	K1	K1	K1	K1	TA1	LE1	BSL2	PGL2
3	2B	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K1	K1	K1	0	0	0	TA1	LE1	BSL2	PGL2
4	3A	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K2	K2	K2	K2	K2	K2	TA1	LE1	BSL2	PGL2
5	3B	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K2	K2	K2	0	0	0	TA1	LE1	BSL2	PGL2
6	4A	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	K3	K3	K3	TA1	LE1	BSL2	PGL2
7	4B	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	0	0	0	TA1	LE1	BSL2	PGL2
8	4C	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	K1	K1	K1	TA1	LE1	BSL2	PGL2
9	4D	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	K2	K2	K2	TA1	LE1	BSL2	PGL2
10	5A	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K4	K4	K4	K4	K4	K4	TA1	LE1	BSL2	PGL2
11	5B	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K4	K4	K4	0	0	0	TA1	LE1	BSL2	PGL2
12	6A	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	K3	K3	K3	TA1	LE1	BSL1	PGL2
13	6B	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	0	0	0	TA1	LE1	BSL1	PGL2
14	7A	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	K3	K3	K3	TA1	LE1	BSL3	PGL2
15	7B	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	0	0	0	TA1	LE1	BSL3	PGL2
16	8A	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	K3	K3	K3	TA1	LE1	BSL2	PGL1
17	8B	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	0	0	0	TA1	LE1	BSL2	PGL1
18	9A	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	K3	K3	K3	TA1	LE1	BSL2	PGL3
19	9B	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	0	0	0	TA1	LE1	BSL2	PGL3
20	11A	N3	N3	N3	N3	N3	N3	P3	P3	P3	0	0	0	K3	K3	K3	K3	K3	K3	TA1	LE1	BSL2	PGL2
21	11B	N3	N3	N3	N3	N3	N3	P3	P3	P3	P1	P1	P1	K3	K3	K3	K3	K3	K3	TA1	LE1	BSL2	PGL2
22	11C	N3	N3	N3	N3	N3	N3	P3	P3	P3	P2	P2	P2	K3	K3	K3	K3	K3	K3	TA1	LE1	BSL2	PGL2
23	12A	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	K3	K3	K3	TA2	LE1	BSL2	PGL2
24	13A	N3	N3	N3	N3	N3	N3	P3	P3	P3	P3	P3	P3	K3	K3	K3	K3	K3	K3	TA1	LE2	BSL2	PGL2

Table 3. Legends for variables in Table 2.

Variable	Specification	Definitions/Observations
Treat	Treatment	
N	Nitrogen	N3 = ideal rate of N for specific crop and region.
P	Phosphorus	Rates of P_2O_5 = 0, P1, P2, P3, with P3 = ideal rate of P_2O_5 for specific crop and region. P1 = P3/4, P2 = P3/2.
K	Potassium	Rates of K_2O = 0, K1, K2, K3, K4, with K3 = ideal rate of K_2O for specific crop and region. K1 = K3/4, K2 = K3/2, K4 = 1.5*K3.
TA	Time of Applicaton	TA 1 = regular practice (ex.: ½ K3 at planting and ½ K3 in top dressing); TA 2 = variation for time of application (1/3 at planting and two top dressings of 1/3 K3 each).
Year		1 to 6
LE	Locality Effect = Placement of K as related to the seed	LE 1 = regular practice (ex.: ½ 5 cm besides and bellow the seeds at planting and ½ at plant emergency); LE 2 = variation for locality effect (all quantity at soil surface).
BS	Base Saturation	Levels of liming BS L1, BS L2, BS L3.
PG	Phosphogypsum	Levels of Phosphogypsum PG L1, PG L2, PG L3.

Table 4. Summary of variables studied at the present experiment outline.

Var #	Specification
1	K rate
2	K residual effect
3	K and base saturation/liming
4	K and phosphogypsum application
5	P rate and P residual effect
6	K time of application
7	K placement

Table 5. Possible comparisons with experiment outline suggested in Table 1.

Comp #	Comparison	Treatments Involved
1	Response curve to K_2O with continuous application of K and regular practices for N, P, K time of application, K locality effect, liming and PG level.	T1, T2, T4, T6 and T10 (A).
2	Response curve to K_2O with K application up to 3rd year and regular practices for N, P, K time of application, K locality effect, liming and PG level (B)	T1, T3, T5, T7 and T11 (B).
3	A vs B = Effect of suspension of K application after 3rd year at regular practices	
4	Effect of different rates of K in residual effect as related to ideal rate (K3)	T6, T7, T8 and T9 (C).
5	Effect of liming on K fertilization with continuous application of K and regular practices	T12, T6 and T14 (D).
6	Effect of liming on K fertilization with application of K up to 3rd year and regular practices	T13, T7 and T15 (E).
7	D vs E = Effect of liming on suspension of K application after 3rd year at regular practices	
8	Effect of phosphogypsum on K fertilization with continuous applicaton of K at regular practices	T16, T6 and T18 (F).
9	Effect of phosphogypsum on K fertilization with application of K up to 3rd year at regular practices	T17, T7 and T19 (G).
10	F vs G = Effect of phosphogypsum on suspension of K application after 3rd year at regular practices.	
11	Response curve to P with full P only up to 3rd year and regular practices	T20, T21, T22 and T6.
12	Effect of timing of K application at regular practices	T6 and T23.
13	Placement effect of K application at regular practices	T6 and T24.

Regular practices = N3, P3, K3, TA1, LE1, BS L2 and PG L2

Results and discussion

A. Crop Season 2011-2012: agronomic results

Tables 6 to 10 show, respectively, the raw data obtained for 2011-2012 soybean yield, 2011-2012 soybean seeds weight, 2011-2012 soybean plant height, 2011-2012 soybean K leaf content, and 2011-2012 soil K availability. Tables 6 to 10 also provide mean comparisons, $p<0.05$, where applicable (comparisons 5, 6, 8, 9, 12 and 13 of Table 5). Mean comparisons at $p<0.10$ were also done for 2011-2012 results with no significant difference. Some comparisons do not make sense now because they were planned to produce feasible results only with time (after suspension of K_2O application in some of the treatments). For example, comparison # 3 do not make sense at this stage once differences among these the two response curves (comparing 1 and 2, Table 5) will only make sense after suspension of K application to study the residual effect. The same applies to comparisons # 7 and # 10 of Table 5.

As mentioned, due to soil properties, only two, and not three, rates of lime and phosphogypsum were applied in 2010. Therefore, the decision was to evaluate such comparisons by mean average and not by model regression as initially expected.

Figures 1 and 2 show the soybean yield response curves for K application as a function of rates. While Figure 1 shows comparisons 1 and 2 (according to Table 5), Figure 2 combines the data. This is due to the fact that there is still no absence of K to study the residual effect. It is clear, as also observed in the first crop season (2010-2011), that there is a response to K for soybean (for example, from 3477 kg/ha when no K_2O was applied to around 4040 kg/ha when 90 kg/ha of K_2O was used), which would be expected in a soil with a medium content of K (57 mg/dm^3). In terms of data analysis there was a statistical significant rate effect for K_2O application for soybean yield (Figure 3) and for soil K availability after soybean harvest (Figure 4). A linear model was adjusted describing both relationships, i.e., soybean yield or soil K availability as a function of applied rates of K_2O. As for this year the response to K_2O was higher than for last year we will need to study carefully if we should cut back on K_2O rates already in the third year or if we should wait for one more year to start studying the residual effect. This is a decision we will need to make pretty soon and for which we intend to discuss internally and also with Mr. Toni Wiendl, from Uralkali Brazil office.

Figures 5 to 7 show, respectively, the effect of K rates for soybean leaf K content, seed weight, and plant height (comparison 1) with no statistical difference.

From all other possible comparisons (lime application, phosphogypsum application, time of application and locality effect; comparisons 5, 6, 8, 9, 12 and 13 of Table 5) only the effect of locality (LE) showed statistical difference (Table 10), with all quantity of K applied at soil surface (treatment 24) leading to higher soil K availability, as related to regular practice (½ of K rate is band applied, while other ½ is broadcast at soil surface after seedling emergence; treatment 6). This is not conclusive as it could be related to atypical rainfall conditions for this season (in 2011-2012 the rainfall amount was much higher than for the 2010-2011.

The fact that other comparisons did not lead to differences is still not important once this is the second crop year. It will be interesting to find out what effects for the different treatments will occur with time, most especially those related to the comparison of treatments with continuous K versus suppression of K. Some of the questions we seek answers are:

(1) For how long (crops) will the suppression of K not influence crop yields?
(2) What will be the response curves to K previously applied, with suppression or not of K_2O application?
(3) What will be the effect of liming in K response (with and without suppression of K_2O application)?
(4) What will be the effect of phosphogypsum application in K response (with and without suppression of K_2O application)?
(5) For how long (crops) will the suppression of P not influence crop yields? (6) Will there be an effect of timing of K application at regular practices?
(7) Will there be a continuous effect of K placement at regular practices?

B. Crop Season 2010-2011: soil test

It must be remembered that these results could not be included into the previous report since they weren´t available at the time.

Table 11 shows the raw data obtained for 2010-2011 soil K availability, and also, provides mean comparisons, $p<0.05$, where applicable (comparisons 5, 6, 8, 9, 12 and 13 of Table 5). Figure 8 shows the soil K availability response curve for K application as a function of rates. It is quite clear that there is an increase in K soil availability (for example, from 49.7 mg/dm^3 when no K_2O was applied to around 62.5 mg/dm^3 when 135 kg/ha of K_2O was used). In general, a small decrease of soil K availability may be observed after maize harvest due to large K uptake by this crop, which will return back into soil by dry matter decomposition. Indeed, compared to the soil K availability observed in the crop season 2011-2012 where maize was not grown, an increase is observed (K in the soil for 2011-2012 higher than K in the soil for 2010-2011; Tables 10 and 11).

For all other possible comparisons (lime application, phosphogypsum application, time of application and locality effect; comparisons 5, 6, 8, 9, 12 and 13 of Table 5) no effect showed statistical difference (Table 11).

Conclusions for second year (2011 – 2012):

(1) Response to K rates was statistically significant for soybean crop.
(2) Response to K rates was statistical significant for soil K availability.
(3) There was locality effect for soil K availability.
(4) There was no effect of lime rate and time of application for this season.
(5) Results are in agreement with initial expectations.
(6) Decision whether to anticipate suppression of K application for the next crop season (one year before previously planned) will be taken after further interaction with BPC.

Table 6. Soybean yield (2011-2012).

Treat #	Treat #		Replicate 1	2	3	4		Average		Comparison 5	6	8	9	12	13
			kg/ha					kg/ha							
1	1		3116.3	3777.1	3781.6	3233.4		**3477.1**							
2	2A		3390.8	3114.9	3666.6	3731.2		**3475.9**							
3	2B		3920.6	3402.4	3797.4	3796.9		**3729.3**							
4	3A		3592.9	3770.8	3678.1	3933.3		**3743.8**							
5	3B		4034.5	3169.1	3411.3	3544.5		**3539.9**							
6	4A		3857.1	3560.5	4008.5	4272.2		**3924.6**		A		A		A	A
7	4B		4183.1	4280.6	3964.3	4195.3		**4155.8**			A		A		
8	4C		4342.5	3988.4	4527.4	3698.2		**4139.1**							
9	4D		3619.3	3285.7	4328.0	4138.6		**3842.9**							
10	5A		4135.5	3974.7	3705.7	4073.3		**3972.3**							
11	5B		3948.0	3555.6	3772.9	4267.6		**3886.0**							
12	6A		3893.7	4183.4	4535.4	4029.4		**4160.5**		A					
13	6B		3719.3	4037.1	4285.0	3742.8		**3946.0**			A				
14	7A		4304.4	4059.6	3922.2	4344.9		**4157.8**		A					
15	7B		3500.1	3822.1	3945.5	4055.3		**3830.8**			A				
16	8A		3246.1	4318.9	3950.9	4420.1		**3984.0**				A			
17	8B		3190.9	4065.2	4353.4	3700.3		**3827.4**					A		
18	9A		3366.5	3423.4	4109.4	4029.9		**3732.3**				A			
19	9B		3340.0	3978.6	4054.7	3991.8		**3841.3**					A		
20	11A		3404.1	3434.1	4107.6	4087.0		**3758.2**							
21	11B		4075.3	4117.6	4074.4	4371.6		**4159.7**							
22	11C		4147.4	4157.9	4106.7	4191.1		**4150.8**							
23	12A		3712.9	3112.4	4007.8	3904.2		**3684.3**						A	
24	13A		3718.2	3978.8	3713.7	3965.1		**3843.9**							A
								CV, %		6.85	5.72	5.94	7.69	3.81	6.21
								msd		606.6	494.2	508.2	657.8	326.3	543.1

Same capital letters in the column indicate no statistical mean difference at p<0.05.
Comparisons 1 relates, with proper statistics, to Figures and not single average comparisons.
Comparison # 5 = treatments 12, 6 and 14 = lime application.
Comparison # 6 = treatments 13, 7 and 15 = lime application.
Comparison # 8 = treatments 16, 6 and 18 = phosphogypsum application.
Comparison # 9 = treatments 17, 7 and 19 = phosphogypsum application.
Comparison # 12 = treatments 6 and 23 = effect of time of application.
Comparison # 13 = treatments 6 and 24 = effect of K locality effect.
For details in such comparisons refer to Table 5.

Table 7. Weight of Soybean seeds (2011-2012).

Treat #	Treat #		Replicate 1	2	3	4		Average		Comparison 5	6	8	9	12	13
			g/1000					g/1000							
1	1		117.38	116.08	115.12	117.99		**116.6**							
2	2A		116.92	115.82	115.13	118.26		**116.5**							
3	2B		119.16	113.84	117.77	117.15		**117.0**							
4	3A		117.23	114.45	120.31	119.03		**117.8**							
5	3B		117.53	116.74	114.90	113.08		**115.6**							
6	4A		117.85	119.24	123.31	123.31		**120.9**		A		A		A	A
7	4B		118.32	119.27	121.67	119.71		**119.7**			A		A		
8	4C		116.05	123.33	122.55	111.26		**118.3**							
9	4D		121.08	117.44	121.33	119.96		**120.0**							
10	5A		114.31	120.45	119.65	116.27		**117.7**							
11	5B		122.27	117.81	116.09	122.55		**119.7**							
12	6A		115.70	120.18	121.04	118.30		**118.8**		A					
13	6B		119.44	120.73	119.30	119.51		**119.7**			A				
14	7A		116.54	120.77	113.57	121.55		**118.1**		A					
15	7B		112.69	113.69	124.07	119.20		**117.4**			A				
16	8A		116.38	119.28	125.81	121.37		**120.7**				A			
17	8B		115.80	120.73	121.69	125.87		**121.0**					A		
18	9A		112.53	119.65	122.47	125.34		**120.0**				A			
19	9B		121.59	120.32	120.43	119.81		**120.5**					A		
20	11A		116.83	114.55	117.28	112.75		**115.4**							
21	11B		123.50	116.44	118.71	114.94		**118.4**							
22	11C		121.59	114.33	120.45	123.50		**120.0**							
23	12A		120.20	116.99	117.71	114.25		**117.3**						A	
24	13A		115.05	120.98	113.55	120.57		**117.5**							A
								CV, %		2.44	2.44	2.00	2.15	2.88	2.81
								msd		6.85	6.31	5.21	5.64	7.74	7.55

Same capital letters in the column indicate no statistical mean difference at p<0.05.
Comparisons 1 relates, with proper statistics, to Figures and not single average comparisons.
Comparison # 5 = treatments 12, 6 and 14 = lime application.
Comparison # 6 = treatments 13, 7 and 15 = lime application.
Comparison # 8 = treatments 16, 6 and 18 = phosphogypsum application.
Comparison # 9 = treatments 17, 7 and 19 = phosphogypsum application.
Comparison # 12 = treatments 6 and 23 = effect of time of application.
Comparison # 13 = treatments 6 and 24 = effect of K locality effect.
For details in such comparisons refer to Table 5.

Table 8. Soybean plant height (2011-2012).

Treat #	Treat #		Replicate 1	2	3	4		Average		Comparison 5	6	8	9	12	13
			cm					cm							
1	1		90.50	90.00	79.00	93.50		**88.3**							
2	2A		94.00	96.00	98.50	99.00		**96.9**							
3	2B		96.50	97.50	99.50	103.00		**99.1**							
4	3A		93.50	87.50	101.50	92.00		**93.6**							
5	3B		98.00	90.50	105.50	94.00		**97.0**							
6	4A		87.50	89.50	95.00	90.00		**90.5**		A		A		A	A
7	4B		96.50	95.00	98.00	86.00		**93.9**			A		A		
8	4C		100.50	93.50	95.50	89.50		**94.8**							
9	4D		91.00	92.00	98.00	97.50		**94.6**							
10	5A		89.00	91.50	94.00	90.00		**91.1**							
11	5B		99.50	92.00	92.50	98.00		**95.5**							
12	6A		92.50	92.50	96.00	90.50		**92.9**		A					
13	6B		94.00	91.00	93.50	86.50		**91.3**			A				
14	7A		88.00	97.00	90.50	94.50		**92.5**		A					
15	7B		85.50	91.00	94.50	91.00		**90.5**			A				
16	8A		81.00	90.00	91.50	96.50		**89.8**				A			
17	8B		86.00	90.00	93.00	97.00		**91.5**					A		
18	9A		94.00	91.50	93.50	92.00		**92.8**				A			
19	9B		92.00	97.00	95.00	98.00		**95.5**					A		
20	11A		93.00	88.00	97.00	91.00		**92.3**							
21	11B		95.00	98.00	91.50	90.00		**93.6**							
22	11C		95.50	94.50	87.00	95.50		**93.1**							
23	12A		91.50	89.50	89.00	94.50		**91.1**						A	
24	13A		85.50	91.50	94.50	96.50		**92.0**							A
								CV, %		3.43	3.93	1.92	5.34	3.77	2.88
								msd		6.33	7.84	3.84	10.86	7.72	5.91

Same capital letters in the column indicate no statistical mean difference at p<0.05.
Comparisons 1 relates, with proper statistics, to Figures and not single average comparisons.
Comparison # 5 = treatments 12, 6 and 14 = lime application.
Comparison # 6 = treatments 13, 7 and 15 = lime application.
Comparison # 8 = treatments 16, 6 and 18 = phosphogypsum application.
Comparison # 9 = treatments 17, 7 and 19 = phosphogypsum application.
Comparison # 12 = treatments 6 and 23 = effect of time of application.
Comparison # 13 = treatments 6 and 24 = effect of K locality effect.
For details in such comparisons refer to Table 5.

Table 9. Soybean leaf K content (2011-2012).

Treat #	Treat #	Replicate 1	2	3	4	Average	Comparison 5	6	8	9	12	13
		g/kg				g/kg						
1	1	19.20	18.50	14.00	21.20	**18.2**						
2	2A	19.60	16.00	21.40	18.60	**18.9**						
3	2B	22.20	16.40	21.00	16.20	**19.0**						
4	3A	17.40	21.20	14.80	19.20	**18.2**						
5	3B	17.20	20.00	14.60	21.20	**18.3**						
6	4A	22.00	17.20	17.60	16.60	**18.4**	A		A		A	A
7	4B	17.00	20.80	20.40	17.80	**19.0**		A		A		
8	4C	21.60	16.60	18.40	22.80	**19.9**						
9	4D	17.80	18.00	16.40	15.40	**16.9**						
10	5A	17.60	18.60	14.80	16.40	**16.9**						
11	5B	18.40	18.80	15.40	17.00	**17.4**						
12	6A	16.00	16.20	16.20	16.00	**16.1**	A					
13	6B	17.60	17.60	16.60	17.60	**17.4**		A				
14	7A	18.80	20.20	17.00	17.00	**18.3**	A					
15	7B	20.60	14.60	22.80	18.40	**19.1**		A				
16	8A	16.40	20.60	21.20	17.00	**18.8**			A			
17	8B	17.60	16.80	16.00	18.80	**17.3**				A		
18	9A	24.60	19.00	17.20	20.20	**20.3**			A			
19	9B	18.60	20.80	20.00	18.20	**19.4**				A		
20	11A	18.60	18.80	19.60	19.00	**19.0**						
21	11B	23.80	17.80	21.80	17.60	**20.3**						
22	11C	19.80	16.60	16.20	20.60	**18.3**						
23	12A	16.80	18.20	18.00	20.20	**18.3**					A	
24	13A	20.20	18.40	19.40	16.00	**18.5**						A
						CV, %	9.07	13.76	9.95	8.33	14.29	6.34
						msd	3.45	5.51	3.93	3.35	5.89	2.62

Same capital letters in the column indicate no statistical mean difference at p<0.05.
Comparisons 1 relates, with proper statistics, to Figures and not single average comparisons.
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Comparison # 6 = treatments 13, 7 and 15 = lime application.
Comparison # 8 = treatments 16, 6 and 18 = phosphogypsum application.
Comparison # 9 = treatments 17, 7 and 19 = phosphogypsum application.
Comparison # 12 = treatments 6 and 23 = effect of time of application.
Comparison # 13 = treatments 6 and 24 = effect of K locality effect.
For details in such comparisons refer to Table 5.

Table 10. Soil K availability (2011-2012).

Treat #	Treat #	Replicate 1	2	3	4	Average	Comparison 5	6	8	9	12	13
		mg/dm^3				mg/dm^3						
1	1	48.00	52.00	44.00	51.00	**48.8**						
2	2A	47.00	52.00	44.00	54.00	**49.3**						
3	2B	54.00	48.00	56.00	54.00	**53.0**						
4	3A	69.00	52.00	77.00	58.00	**64.0**						
5	3B	62.00	55.00	65.00	56.00	**59.5**						
6	4A	72.00	66.00	68.00	57.00	**65.8**	A		A		A	B
7	4B	84.00	61.00	73.00	74.00	**73.0**		A		A		
8	4C	73.00	72.00	87.00	64.00	**74.0**						
9	4D	78.00	60.00	79.00	59.00	**69.0**						
10	5A	93.00	87.00	80.00	83.00	**85.8**						
11	5B	73.00	68.00	86.00	69.00	**74.0**						
12	6A	76.00	54.00	91.00	68.00	**72.3**	A					
13	6B	85.00	70.00	57.00	77.00	**72.3**		A				
14	7A	75.00	78.00	78.00	67.00	**74.5**	A					
15	7B	98.00	60.00	69.00	69.00	**74.0**		A				
16	8A	74.00	69.00	58.00	66.00	**66.8**			A			
17	8B	64.00	76.00	67.00	69.00	**69.0**				A		
18	9A	58.00	63.00	65.00	60.00	**61.5**			A			
19	9B	72.00	64.00	60.00	74.00	**67.5**				A		
20	11A	75.00	74.00	53.00	85.00	**71.8**						
21	11B	69.00	56.00	63.00	51.00	**59.8**						
22	11C	63.00	62.00	71.00	57.00	**63.3**						
23	12A	68.00	65.00	94.00	73.00	**75.0**					A	
24	13A	93.00	76.00	97.00	81.00	**86.8**						A
						CV, %	12.51	10.41	13.61	11.17	14.28	7.45
						msd	19.21	16.51	19.63	16.92	22.63	12.79

Same capital letters in the column indicate no statistical mean difference at p<0.05.
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Comparison # 9 = treatments 17, 7 and 19 = phosphogypsum application.
Comparison # 12 = treatments 6 and 23 = effect of time of application.
Comparison # 13 = treatments 6 and 24 = effect of K locality effect.
For details in such comparisons refer to Table 5.

Table 11. Soil K availability (2010-2011).

Treat #	Treat #	Replicate 1	2	3	4	Average	Comparison 5	6	8	9	12	13
		mg/dm^3				mg/dm^3						
1	1	50.0	53.0	49.0	47.0	**49.8**						
2	2A	59.0	45.0	54.0	51.0	**52.3**						
3	2B	58.0	48.0	49.0	53.0	**52.0**						
4	3A	53.0	61.0	49.0	53.0	**54.0**						
5	3B	47.0	57.0	54.0	52.0	**52.5**						
6	4A	59.0	70.0	61.0	59.0	**62.3**	A		A		A	A
7	4B	68.0	61.0	65.0	64.0	**64.5**		A		A		
8	4C	66.0	73.0	65.0	62.0	**66.5**						
9	4D	55.0	62.0	66.0	67.0	**62.5**						
10	5A	65.0	61.0	61.0	63.0	**62.5**						
11	5B	70.0	67.0	68.0	65.0	**67.5**						
12	6A	64.0	62.0	57.0	66.0	**62.3**	A					
13	6B	65.0	69.0	57.0	62.0	**63.3**		A				
14	7A	71.0	58.0	74.0	70.0	**68.3**	A					
15	7B	63.0	57.0	71.0	53.0	**61.0**		A				
16	8A	66.0	64.0	65.0	68.0	**65.8**			A			
17	8B	59.0	64.0	64.0	57.0	**61.0**				A		
18	9A	64.0	68.0	62.0	62.0	**64.0**			A			
19	9B	61.0	58.0	67.0	58.0	**61.0**				A		
20	11A	68.0	67.0	68.0	82.0	**71.3**						
21	11B	62.0	55.0	70.0	71.0	**64.5**						
22	11C	77.0	57.0	79.0	81.0	**73.5**						
23	12A	61.0	56.0	61.0	65.0	**60.8**					A	
24	13A	63.0	59.0	64.0	67.0	**63.3**						A
						CV, %	10.46	9.82	5.36	5.22	10.00	9.33
						msd	14.58	13.41	7.45	7.04	13.84	13.2

Same capital letters in the column indicate no statistical mean difference at p<0.05.
Comparisons 1 relates, with proper statistics, to Figures and not single average comparisons.
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Comparison # 9 = treatments 17, 7 and 19 = phosphogypsum application.
Comparison # 12 = treatments 6 and 23 = effect of time of application.
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For details in such comparisons refer to Table 5.

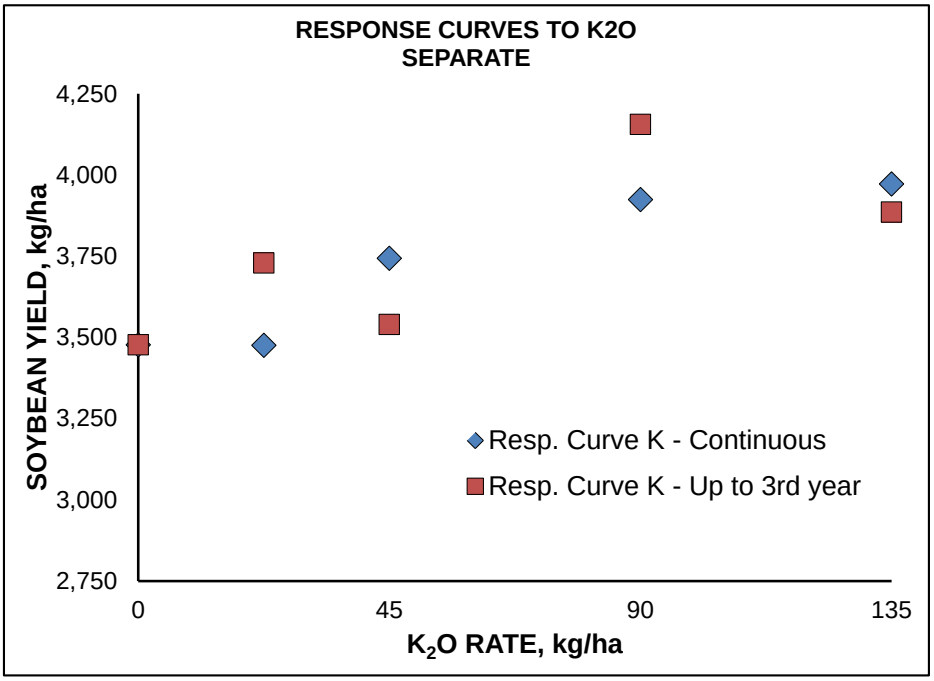

Figure 1. Soybean yield response curve to K_2O rates (separate curves for comparisons 1 and 2 at Table 5). Crop season 2011-2012.

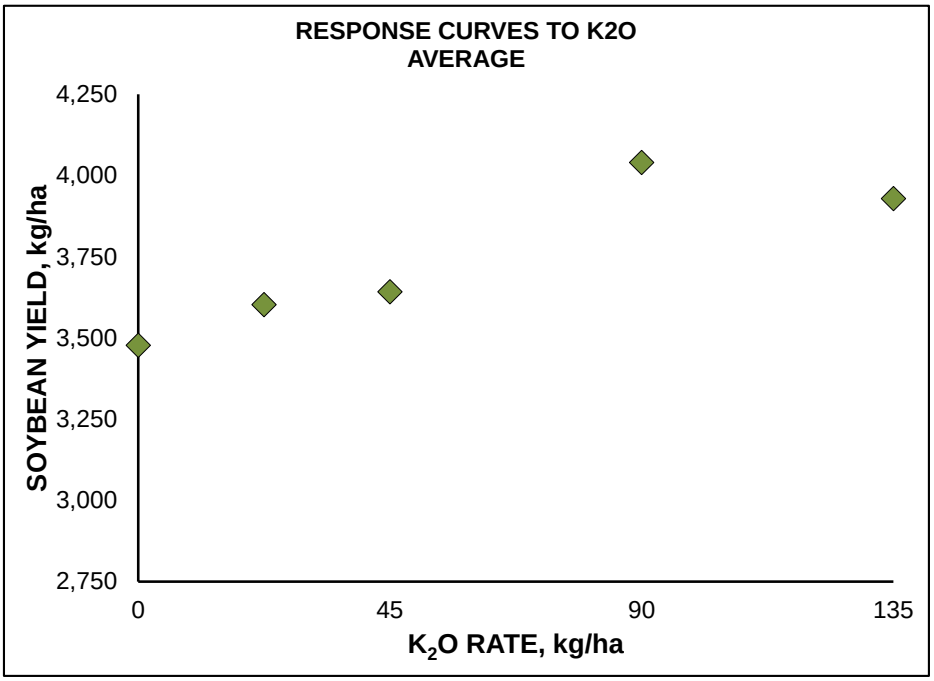

Figure 2. Soybean yield response curve to K_2O rates (average for comparisons 1 and 2 at Table 5). Crop season 2011-2012.

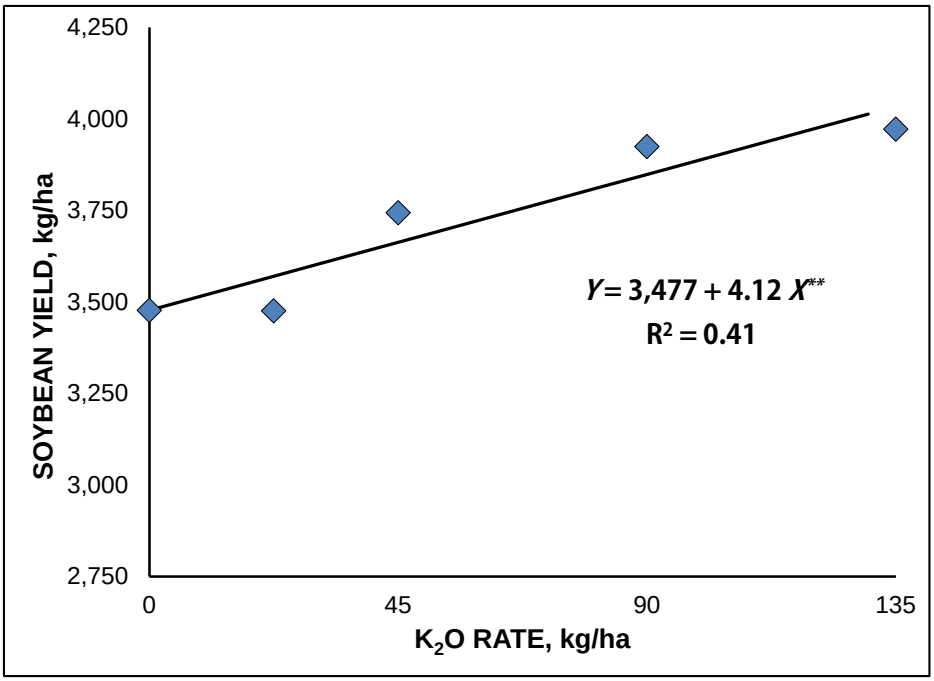

Figure 3. Soybean yield response curve to K_2O rates with linear model adjusted (comparison 1). Crop season 2011-2012.

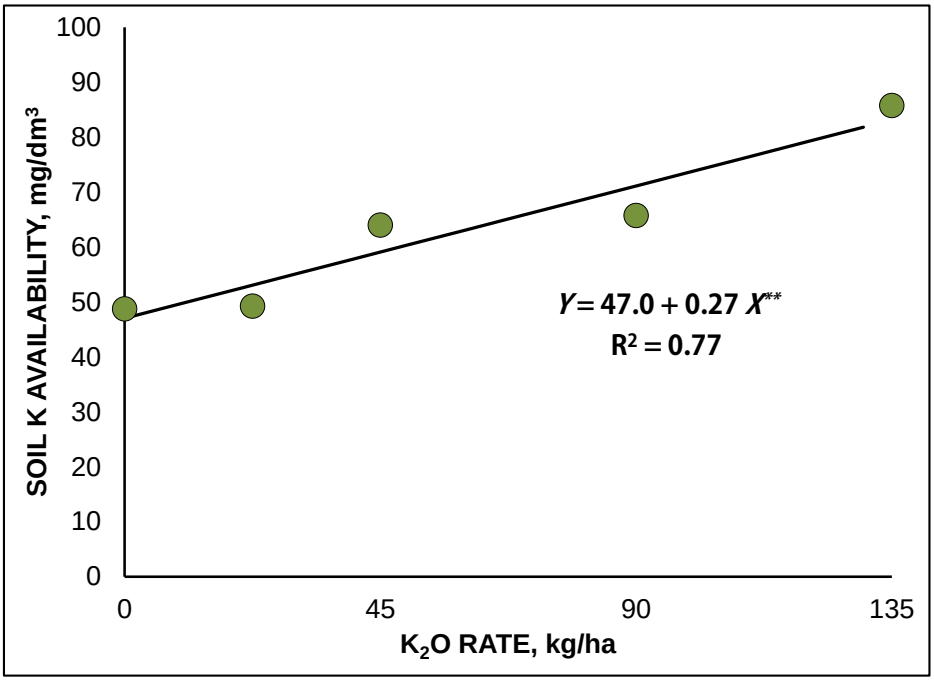

Figure 4. Soil K availability, after soybean harvest, response curve to K_2O rates with linear model adjusted (comparison 1). Crop season 2011-2012.

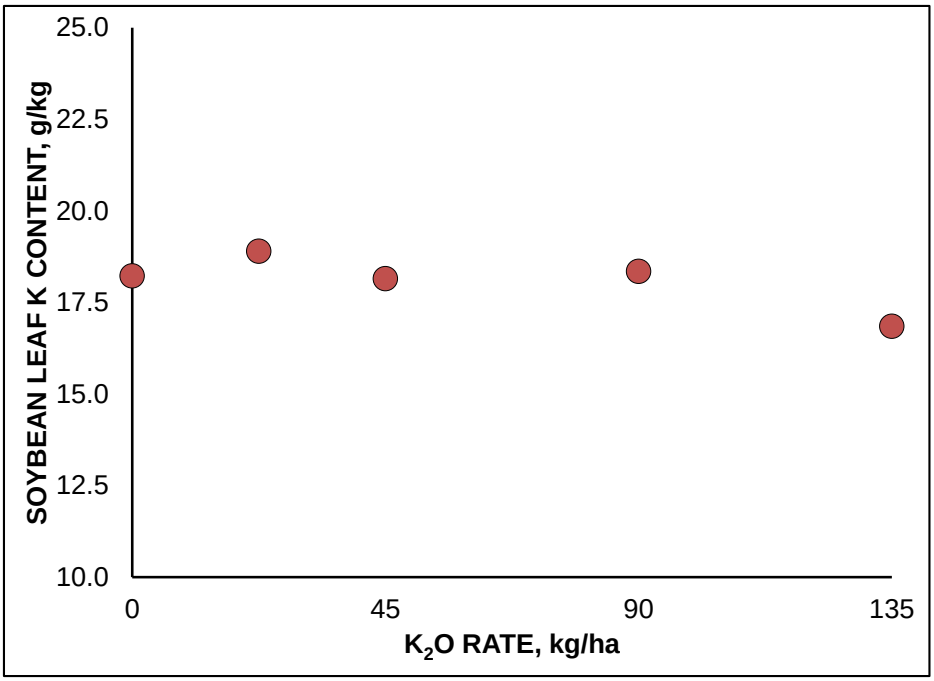

Figure 5. Soybean leaf K content in response to K_2O rates (comparison 1). P>F not significant. Crop season 2011-2012.

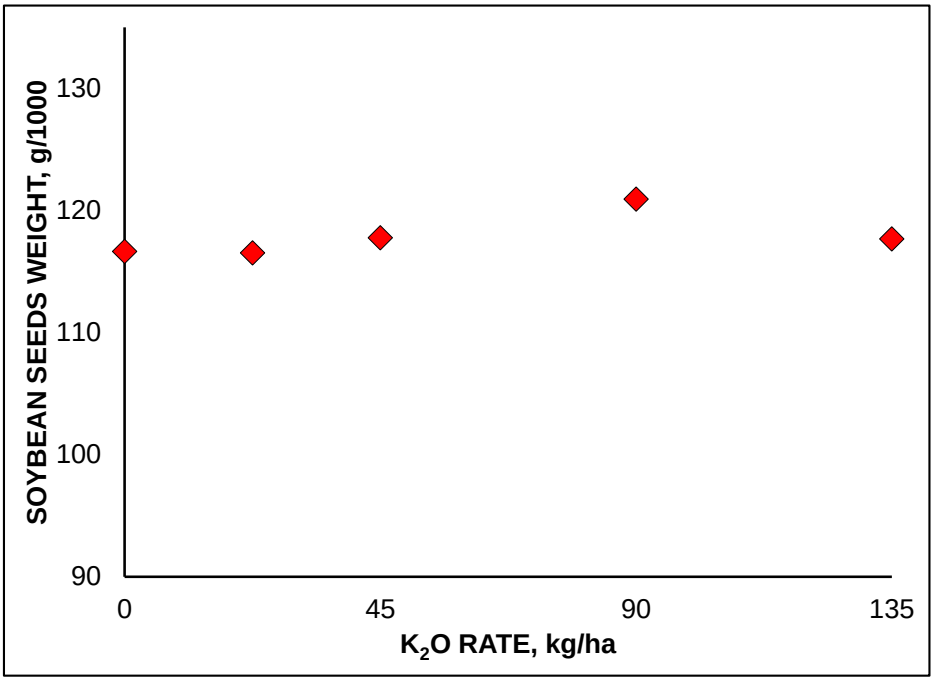

Figure 6. Soybean seeds weight in response to K_2O rates (comparison 1). P>F not significant. Crop season 2011-2012.

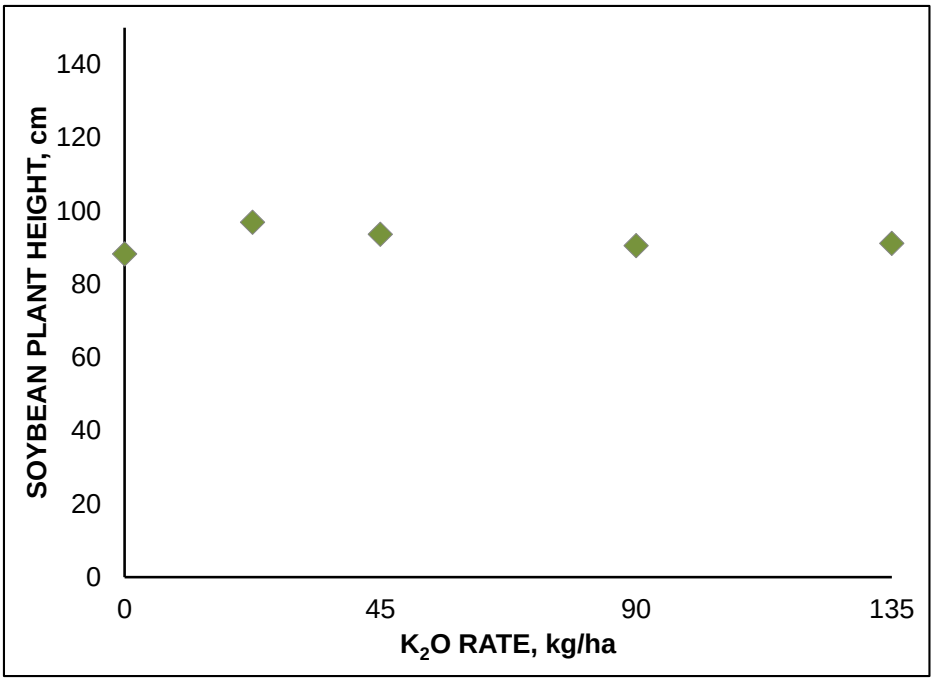

Figure 7. Soybean plant height in response to K_2O rates (comparison 1). P>F not significant. Crop season 2011-2012.

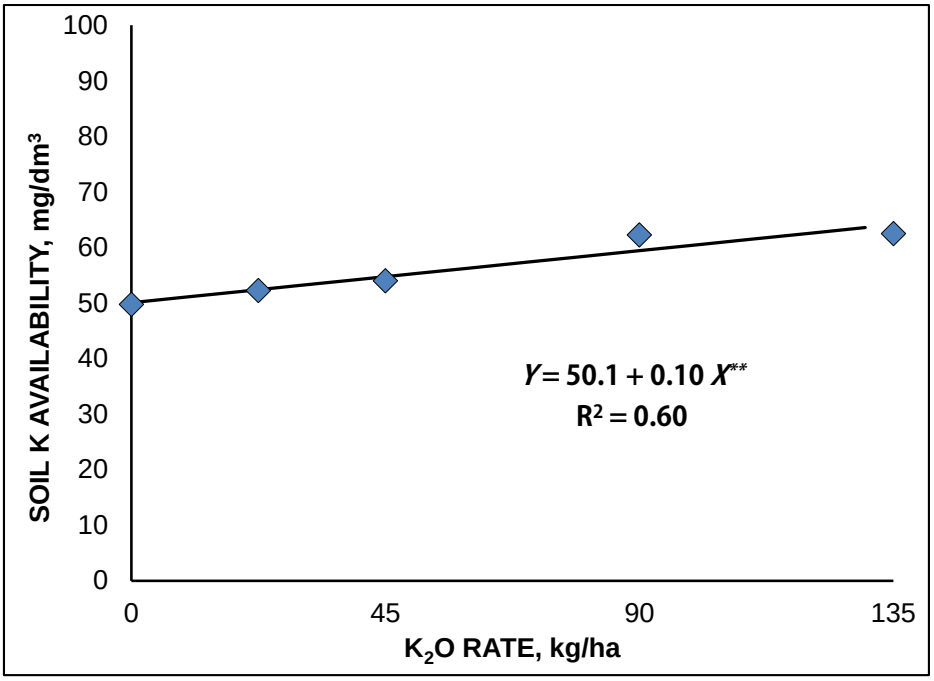

Figure 8. Soil K availability, after maize harvest, response curve to K_2O rates with linear model adjusted (comparison 1). Crop season 2010-2011.

Appendix A. Raw data of Soybean agronomical features and nutritional status, season 2011-2012.

T#	T#	Rep	Plot#	Yield (kg/ha)	SW[(1)] (g/1000)	PH[(2)] (cm)	Nutrient leaf status (g/kg)					
							N	P	K	Ca	Mg	S
1	1	1	1083	3116.3	117.38	90.50	54.60	3.90	19.20	6.90	4.20	2.60
1	1	2	1086	3777.1	116.08	90.00	61.60	4.20	18.50	7.65	4.35	2.42
1	1	3	1088	3781.6	115.12	79.00	54.60	2.80	14.00	7.65	4.20	2.06
1	1	4	1089	3233.4	117.99	93.50	55.30	3.50	21.20	6.90	3.98	2.26
2	2A	1	1065	3390.8	116.92	94.00	56.00	3.60	19.60	6.75	3.75	2.23
2	2A	2	1053	3114.9	115.82	96.00	54.60	3.10	16.00	10.35	4.35	2.13
2	2A	3	1062	3666.6	115.13	98.50	57.40	4.10	21.40	6.90	4.20	2.07
2	2A	4	1057	3731.2	118.26	99.00	54.60	2.60	18.60	7.95	4.35	2.16
3	2B	1	1066	3920.6	119.16	96.50	60.20	3.70	22.20	6.00	4.05	2.22
3	2B	2	1054	3402.4	113.84	97.50	56.00	3.00	16.40	7.80	4.20	2.11
3	2B	3	1061	3797.4	117.77	99.50	56.00	3.70	21.00	8.25	4.05	2.11
3	2B	4	1058	3796.9	117.15	103.00	57.40	3.40	16.20	8.55	3.45	2.20
4	3A	1	1052	3592.9	117.23	93.50	51.80	2.90	17.40	10.50	4.95	2.11
4	3A	2	1063	3770.8	114.45	87.50	58.10	4.10	21.20	7.95	4.50	2.20
4	3A	3	1056	3678.1	120.31	101.50	56.00	2.70	14.80	7.35	4.50	2.02
4	3A	4	1060	3933.3	119.03	92.00	56.00	3.60	19.20	7.20	4.20	2.17
5	3B	1	1051	4034.5	117.53	98.00	54.60	2.80	17.20	9.15	4.50	2.05
5	3B	2	1064	3169.1	116.74	90.50	53.20	3.70	20.00	6.60	3.45	2.25
5	3B	3	1055	3411.3	114.90	105.50	56.00	2.80	14.60	8.70	3.75	2.15
5	3B	4	1059	3544.5	113.08	94.00	58.80	4.20	21.20	7.65	4.35	2.29
6	4A	1	1099	3857.1	117.85	87.50	49.00	3.00	22.00	8.10	4.35	2.17
6	4A	2	1111	3560.5	119.24	89.50	60.90	2.70	17.20	7.50	3.75	2.10
6	4A	3	1110	4008.5	123.31	95.00	61.60	3.50	17.60	7.65	4.05	2.20
6	4A	4	1106	4272.2	123.31	90.00	54.60	2.00	16.60	8.85	3.90	2.09
7	4B	1	1100	4183.1	118.32	96.50	56.00	3.20	17.00	7.20	4.05	2.23
7	4B	2	1112	4280.6	119.27	95.00	62.30	3.30	20.80	7.80	4.35	2.40
7	4B	3	1109	3964.3	121.67	98.00	58.80	3.40	20.40	7.95	3.98	2.16
7	4B	4	1105	4195.3	119.71	86.00	56.00	2.80	17.80	7.95	4.35	2.15
8	4C	1	1113	4342.5	116.05	100.50	60.20	2.30	21.60	6.90	4.05	2.16
8	4C	2	1101	3988.4	123.33	93.50	53.20	2.40	16.60	8.55	4.20	2.59
8	4C	3	1104	4527.4	122.55	95.50	51.80	2.90	18.40	7.80	3.90	2.11
8	4C	4	1108	3698.2	111.26	89.50	61.60	2.70	22.80	7.50	4.20	2.26
9	4D	1	1114	3619.3	121.08	91.00	56.00	3.30	17.80	6.60	4.20	2.09
9	4D	2	1102	3285.7	117.44	92.00	51.80	3.00	18.00	7.65	3.90	2.03
9	4D	3	1103	4328.0	121.33	98.00	54.60	3.00	16.40	7.50	4.20	2.14
9	4D	4	1107	4138.6	119.96	97.50	57.40	2.10	15.40	7.65	4.50	2.11
10	5A	1	1082	4135.5	114.31	89.00	53.20	2.90	17.60	7.05	4.05	2.15
10	5A	2	1079	3974.7	120.45	91.50	57.40	2.50	18.60	8.55	4.65	2.46
10	5A	3	1077	3705.7	119.65	94.00	53.20	2.70	14.80	7.95	4.35	2.11
10	5A	4	1076	4073.3	116.27	90.00	50.40	2.80	16.40	7.80	4.28	2.64
11	5B	1	1081	3948.0	122.27	99.50	51.80	2.70	18.40	8.25	4.50	2.11
11	5B	2	1080	3555.6	117.81	92.00	49.00	2.70	18.80	7.20	4.50	2.14
11	5B	3	1078	3772.9	116.09	92.50	54.60	2.60	15.40	7.05	4.05	2.22
11	5B	4	1075	4267.6	122.55	98.00	56.00	3.00	17.00	7.65	4.05	2.33
12	6A	1	1115	3893.7	115.70	92.50	53.20	3.00	16.00	6.90	4.28	2.13
12	6A	2	1118	4183.4	120.18	92.50	51.80	2.90	16.20	7.50	4.50	2.15
12	6A	3	1125	4535.4	121.04	96.00	57.40	2.50	16.20	7.35	4.05	2.11
12	6A	4	1123	4029.4	118.30	90.50	54.60	2.90	16.00	6.90	4.05	2.12
13	6B	1	1129	3719.3	119.44	94.00	56.70	2.80	17.60	9.30	4.95	2.34
13	6B	2	1127	4037.1	120.73	91.00	53.20	2.70	17.60	7.35	4.35	2.38
13	6B	3	1119	4285.0	119.30	93.50	54.60	3.20	16.60	7.35	4.35	2.20
13	6B	4	1124	3742.8	119.51	86.50	55.30	2.60	17.60	7.20	3.90	2.05

(1) Seed weight. (2) Plant height.

Continuing …

T#	T#	Rep	Plot#	Yield (kg/ha)	SW[(1)] (g/1000)	PH[(2)] (cm)	Nutrient leaf status (g/kg)					
							N	P	K	Ca	Mg	S
14	7A	1	1116	4304.4	116.54	88.00	56.00	3.50	18.80	7.35	4.35	7.22
14	7A	2	1128	4059.6	120.77	97.00	56.00	3.90	20.20	7.80	4.20	2.20
14	7A	3	1120	3922.2	113.57	90.50	47.60	2.90	17.00	7.65	4.65	2.13
14	7A	4	1122	4344.9	121.55	94.50	57.40	3.30	17.00	7.20	3.90	2.02
15	7B	1	1130	3500.1	112.69	85.50	51.80	3.50	20.60	7.20	4.35	2.11
15	7B	2	1117	3822.1	113.69	91.00	53.20	2.80	14.60	6.60	4.20	2.13
15	7B	3	1126	3945.5	124.07	94.50	58.10	3.10	22.80	7.20	4.20	2.17
15	7B	4	1121	4055.3	119.20	91.00	51.80	3.10	18.40	7.35	4.05	2.15
16	8A	1	1131	3246.1	116.38	81.00	56.00	2.60	16.40	7.80	4.05	2.16
16	8A	2	1134	4318.9	119.28	90.00	54.60	3.50	20.60	8.25	4.20	2.17
16	8A	3	1135	3950.9	125.81	91.50	58.80	4.10	21.20	7.50	4.13	2.45
16	8A	4	1140	4420.1	121.37	96.50	50.40	2.70	17.00	7.35	4.35	2.26
17	8B	1	1146	3190.9	115.80	86.00	54.60	2.70	17.60	6.45	4.35	2.22
17	8B	2	1144	4065.2	120.73	90.00	49.00	2.90	16.80	8.10	4.50	2.14
17	8B	3	1142	4353.4	121.69	93.00	56.00	2.60	16.00	6.60	3.98	2.11
17	8B	4	1137	3700.3	125.87	97.00	58.80	2.80	18.80	7.20	4.50	2.29
18	9A	1	1132	3366.5	112.53	94.00	53.20	3.60	24.60	7.05	3.90	2.19
18	9A	2	1143	3423.4	119.65	91.50	51.80	2.70	19.00	5.85	3.45	2.19
18	9A	3	1141	4109.4	122.47	93.50	57.40	2.60	17.20	6.45	3.90	2.16
18	9A	4	1138	4029.9	125.34	92.00	60.20	3.50	20.20	7.80	4.20	2.34
19	9B	1	1145	3340.0	121.59	92.00	56.00	3.20	18.60	6.75	4.20	2.42
19	9B	2	1133	3978.6	120.32	97.00	61.60	3.90	20.80	6.90	4.20	2.28
19	9B	3	1136	4054.7	120.43	95.00	61.60	3.90	20.00	7.35	4.05	2.14
19	9B	4	1139	3991.8	119.81	98.00	59.50	3.20	18.20	8.10	4.50	2.14
20	11A	1	1098	3404.1	116.83	93.00	50.40	3.10	18.60	7.35	4.05	2.48
20	11A	2	1085	3434.1	114.55	88.00	57.40	3.30	18.80	7.20	3.75	2.16
20	11A	3	1094	4107.6	117.28	97.00	58.80	2.30	19.60	8.10	4.05	2.20
20	11A	4	1092	4087.0	112.75	91.00	49.00	3.00	19.00	7.50	3.75	2.05
21	11B	1	1084	4075.3	123.50	95.00	58.80	3.40	23.80	6.75	4.20	2.28
21	11B	2	1095	4117.6	116.44	98.00	56.00	3.20	17.80	8.55	4.05	2.16
21	11B	3	1087	4074.4	118.71	91.50	60.20	3.70	21.80	7.35	4.05	2.09
21	11B	4	1091	4371.6	114.94	90.00	53.20	3.20	17.60	7.65	4.05	2.10
22	11C	1	1097	4147.4	121.59	95.50	53.90	3.20	19.80	8.25	4.20	2.14
22	11C	2	1096	4157.9	114.33	94.50	53.20	2.80	16.60	8.85	4.28	2.23
22	11C	3	1093	4106.7	120.45	87.00	51.80	2.90	16.20	8.25	4.20	2.10
22	11C	4	1090	4191.1	123.50	95.50	56.00	3.60	20.60	7.50	4.35	2.32
23	12A	1	1068	3712.9	120.20	91.50	51.80	2.70	16.80	8.25	4.05	2.15
23	12A	2	1069	3112.4	116.99	89.50	54.60	3.30	18.20	9.90	4.65	2.04
23	12A	3	1072	4007.8	117.71	89.00	50.40	3.00	18.00	7.05	3.90	2.14
23	12A	4	1073	3904.2	114.25	94.50	56.00	3.60	20.20	6.75	3.75	2.25
24	12B	1	1067	3718.2	115.05	85.50	56.00	3.30	20.20	7.95	4.20	2.36
24	12B	2	1070	3978.8	120.98	91.50	56.00	3.20	18.40	8.10	4.35	2.20
24	12B	3	1071	3713.7	113.55	94.50	53.20	3.30	19.40	6.75	3.15	2.36
24	12B	4	1074	3965.1	120.57	96.50	53.20	3.10	16.00	7.95	4.35	2.20

(1) Seed weight. (2) Plant height.

Appendix B. Raw data of soil testing after the Soybean harvest, season 2011-2012.

T#	T#	Rep	Plot#	Soil pH		P	K	Ca	Mg	H	CEC	OM	BS
				H_2O	$CaCl_2$	mg/dm^3		cmol$_c$/dm^3				g/kg	%
1	1	1	1083	5.60	4.80	15.80	48.00	2.60	1.00	5.60	9.32	39.90	39.93
1	1	2	1086	6.20	5.30	17.40	52.00	3.40	1.20	3.70	8.43	35.80	56.13
1	1	3	1088	5.40	4.70	13.40	44.00	2.10	0.80	5.50	8.81	37.80	34.19
1	1	4	1089	5.40	4.60	18.50	51.00	2.10	0.90	5.90	9.35	39.90	33.66
2	2A	1	1065	5.70	4.90	18.50	47.00	3.00	1.10	5.50	9.72	43.30	43.42
2	2A	2	1053	6.10	5.20	20.20	52.00	3.70	1.40	5.20	10.43	45.80	50.16
2	2A	3	1062	5.70	4.90	17.40	44.00	2.80	1.10	5.50	9.51	41.00	42.18
2	2A	4	1057	5.80	5.10	15.30	54.00	3.20	1.20	5.00	9.51	39.90	47.41
3	2B	1	1066	6.10	5.20	16.80	54.00	3.60	1.30	4.90	9.94	44.50	50.70
3	2B	2	1054	5.80	5.10	15.30	48.00	3.40	1.20	5.40	10.17	44.50	46.93
3	2B	3	1061	5.60	4.80	17.90	56.00	2.60	1.00	5.60	9.37	39.90	40.23
3	2B	4	1058	5.80	5.00	26.00	54.00	3.40	1.20	5.50	10.24	44.50	46.28
4	3A	1	1052	6.00	5.20	16.80	69.00	3.70	1.30	5.30	10.48	44.50	49.41
4	3A	2	1063	5.60	4.90	15.30	52.00	2.40	1.00	5.10	8.63	35.80	40.93
4	3A	3	1056	5.70	4.90	17.90	77.00	2.80	1.10	5.60	9.70	41.00	42.25
4	3A	4	1060	5.70	4.90	15.30	58.00	3.10	1.20	5.70	10.15	44.50	43.84
5	3B	1	1051	5.90	5.20	15.80	62.00	3.20	1.20	4.80	9.36	38.90	48.71
5	3B	2	1064	5.90	5.10	19.60	55.00	3.40	1.20	5.00	9.74	41.00	48.67
5	3B	3	1055	5.50	4.70	13.40	65.00	2.40	1.00	6.00	9.77	43.30	36.52
5	3B	4	1059	6.10	5.30	22.00	56.00	3.90	1.50	4.80	10.34	45.80	53.59
6	4A	1	1099	5.70	4.90	14.30	72.00	2.40	1.00	5.00	8.58	36.80	41.76
6	4A	2	1111	5.80	5.10	21.40	66.00	3.20	1.20	5.20	9.77	43.30	46.77
6	4A	3	1110	5.70	4.90	17.40	68.00	2.90	1.10	5.40	9.57	41.00	43.60
6	4A	4	1106	5.70	4.90	17.40	57.00	2.60	1.00	5.20	8.92	37.80	41.71
7	4B	1	1100	5.80	5.00	24.60	84.00	3.10	1.20	5.20	9.72	43.30	46.48
7	4B	2	1112	5.70	5.00	16.80	61.00	3.20	1.20	5.30	9.86	44.50	46.23
7	4B	3	1109	5.40	4.60	14.80	73.00	2.00	0.80	5.60	8.89	37.80	33.61
7	4B	4	1105	5.60	4.80	13.40	74.00	2.20	0.90	5.00	8.29	35.80	39.68
8	4C	1	1113	5.80	5.00	17.40	73.00	3.30	1.20	5.40	10.09	45.80	46.47
8	4C	2	1101	5.70	5.00	23.30	72.00	3.10	1.10	5.30	9.68	41.00	45.27
8	4C	3	1104	5.40	4.70	15.80	87.00	2.10	0.90	5.70	9.22	37.80	34.95
8	4C	4	1108	5.30	4.60	14.30	64.00	2.00	0.80	5.90	9.16	38.90	32.34
9	4D	1	1114	5.70	5.00	17.90	78.00	2.90	1.10	5.40	9.60	41.00	43.75
9	4D	2	1102	5.50	4.70	15.80	60.00	2.30	0.90	5.60	9.25	38.90	36.24
9	4D	3	1103	5.70	4.90	15.30	79.00	2.80	1.10	5.20	9.30	39.90	44.10
9	4D	4	1107	5.80	5.00	18.50	59.00	3.10	1.10	5.10	9.45	39.90	46.04
10	5A	1	1082	5.70	5.00	22.60	93.00	2.90	1.10	5.10	9.34	39.90	45.39
10	5A	2	1079	5.70	4.90	17.90	87.00	2.80	1.10	5.40	9.52	41.00	43.30
10	5A	3	1077	5.60	4.90	16.30	80.00	2.60	1.00	5.40	9.21	38.90	41.34
10	5A	4	1076	5.60	4.80	13.40	83.00	2.50	1.00	5.50	9.21	39.90	40.30
11	5B	1	1081	5.90	5.10	19.00	73.00	3.30	1.20	5.00	9.69	41.00	48.39
11	5B	2	1080	5.80	5.00	25.30	68.00	3.10	1.20	5.20	9.67	42.20	46.25
11	5B	3	1078	5.60	4.80	15.80	86.00	2.60	1.00	5.90	9.72	41.00	39.30
11	5B	4	1075	5.70	5.00	23.90	69.00	2.80	1.10	4.90	8.98	37.80	45.42
12	6A	1	1115	5.70	4.90	18.50	76.00	2.80	1.10	5.30	9.39	39.90	43.59
12	6A	2	1118	5.70	5.00	23.90	54.00	3.00	1.10	5.40	9.64	41.00	43.97
12	6A	3	1125	5.70	4.90	17.40	91.00	2.60	1.00	5.10	8.93	37.80	42.91
12	6A	4	1123	5.70	4.90	17.90	68.00	2.80	1.00	5.40	9.37	39.90	42.40
13	6B	1	1129	5.70	5.00	28.20	85.00	2.90	1.10	5.00	9.22	39.90	45.76
13	6B	2	1127	5.80	5.10	21.40	70.00	3.20	1.20	5.20	9.78	43.30	46.83
13	6B	3	1119	5.80	5.00	17.90	57.00	3.10	1.20	5.20	9.65	42.20	46.09
13	6B	4	1124	5.30	4.60	15.80	77.00	1.90	0.70	5.90	9.00	38.90	31.09

Continuing …

T#	T#	Rep	Plot#	Soil pH		P	K	Ca	Mg	H	CEC	OM	BS
				H_2O	$CaCl_2$	mg/dm^3		cmol$_c$/dm^3				g/kg	%
14	7A	1	1116	6.20	5.30	20.80	75.00	3.80	1.40	4.30	9.69	41.00	55.63
14	7A	2	1128	6.30	5.60	16.80	78.00	3.80	1.40	3.40	8.80	37.80	61.36
14	7A	3	1120	6.20	5.30	12.50	78.00	3.60	1.30	4.00	9.10	38.90	56.04
14	7A	4	1122	6.30	5.60	17.40	67.00	3.70	1.40	3.40	8.67	36.80	60.79
15	7B	1	1130	6.20	5.40	22.00	98.00	3.40	1.20	3.70	8.55	35.80	56.73
15	7B	2	1117	6.20	5.50	19.00	60.00	4.10	1.50	4.00	9.75	42.20	58.99
15	7B	3	1126	6.10	5.30	19.00	69.00	3.30	1.20	4.10	8.78	38.90	53.29
15	7B	4	1121	6.20	5.50	26.00	69.00	3.70	1.40	3.80	9.08	39.90	58.14
16	8A	1	1131	5.60	4.80	23.30	74.00	2.50	1.00	5.60	9.29	39.90	39.72
16	8A	2	1134	5.70	4.90	23.30	69.00	2.60	1.00	5.20	8.98	38.90	42.07
16	8A	3	1135	5.50	4.80	17.90	58.00	2.30	0.90	5.30	8.75	37.80	38.28
16	8A	4	1140	5.30	4.60	29.00	66.00	2.00	0.80	6.10	9.37	38.90	31.69
17	8B	1	1146	5.80	5.00	21.40	64.00	3.20	1.20	5.30	9.86	42.20	46.27
17	8B	2	1144	5.70	4.90	23.30	76.00	2.60	1.00	5.00	8.79	38.90	43.15
17	8B	3	1142	5.60	4.80	19.00	67.00	2.50	1.00	5.40	9.07	37.80	40.47
17	8B	4	1137	5.40	4.60	17.40	69.00	2.00	0.80	5.50	8.78	37.80	33.92
18	9A	1	1132	5.60	4.90	17.40	58.00	2.70	1.00	5.40	9.25	38.90	41.61
18	9A	2	1143	5.90	5.20	14.80	63.00	3.30	1.20	4.90	9.56	39.90	48.75
18	9A	3	1141	5.80	5.10	15.80	65.00	3.20	1.20	5.10	9.67	41.00	47.24
18	9A	4	1138	5.50	4.70	19.60	60.00	2.40	1.00	5.60	9.35	39.90	37.99
19	9B	1	1145	5.60	4.90	19.00	72.00	2.50	1.00	5.20	8.88	37.80	41.47
19	9B	2	1133	5.80	5.10	20.80	64.00	3.00	1.20	4.80	9.16	39.90	47.62
19	9B	3	1136	5.90	5.20	14.30	60.00	3.30	1.20	4.80	9.45	39.90	49.23
19	9B	4	1139	5.70	4.90	17.90	74.00	2.50	1.00	5.00	8.69	37.80	42.46
20	11A	1	1098	5.40	4.60	13.40	75.00	1.90	0.70	5.20	8.29	35.80	33.67
20	11A	2	1085	6.00	5.20	23.90	74.00	3.60	1.30	4.80	9.89	43.30	51.46
20	11A	3	1094	5.70	4.90	15.30	53.00	2.70	1.00	5.00	8.84	37.80	43.41
20	11A	4	1092	5.50	4.70	18.50	85.00	2.00	0.80	4.80	8.02	33.90	37.64
21	11B	1	1084	5.80	5.10	19.00	69.00	3.10	1.20	5.00	9.48	41.00	47.24
21	11B	2	1095	5.80	5.00	20.20	56.00	3.00	1.10	5.10	9.34	39.90	45.42
21	11B	3	1087	5.80	5.10	25.30	63.00	3.10	1.20	5.00	9.46	41.00	47.15
21	11B	4	1091	5.50	4.80	16.80	51.00	1.90	0.70	4.40	7.23	29.50	37.77
22	11C	1	1097	5.70	5.00	19.00	63.00	2.80	1.10	5.00	9.06	38.90	44.82
22	11C	2	1096	5.90	5.20	16.30	62.00	3.40	1.20	4.90	9.66	41.00	49.27
22	11C	3	1093	5.40	4.60	11.60	71.00	1.80	0.70	4.90	7.88	33.00	34.03
22	11C	4	1090	5.60	4.80	19.60	57.00	2.50	1.00	5.70	9.32	39.90	38.84
23	12A	1	1068	5.90	5.10	15.30	68.00	3.30	1.20	5.00	9.67	41.00	48.32
23	12A	2	1069	5.70	5.00	17.90	65.00	2.90	1.10	5.30	9.47	39.90	44.01
23	12A	3	1072	5.50	4.80	14.80	94.00	2.40	0.90	5.60	9.24	38.90	38.32
23	12A	4	1073	5.70	4.90	18.50	73.00	2.60	1.00	5.00	8.79	37.80	43.10
24	12B	1	1067	6.00	5.20	25.30	93.00	3.40	1.30	5.10	10.04	45.80	49.20
24	12B	2	1070	5.80	5.00	19.60	76.00	3.00	1.10	5.10	9.39	38.90	45.72
24	12B	3	1071	5.70	4.90	15.30	97.00	2.50	1.00	5.20	8.95	37.80	41.89
24	12B	4	1074	5.90	5.20	19.00	81.00	3.20	1.20	4.70	9.31	39.90	49.50

Appendix C. Raw data of soil testing after the Maize harvest, season 2010-2011.

T#	T#	Rep	Plot#	Soil pH		P	K	Ca	Mg	H	CEC	OM	BS
				H_2O	$CaCl_2$	mg/dm^3		cmol$_c$/dm^3				g/kg	%
1	1	1	1083	5.4	4.7	12.3	50	2.3	0.9	7.2	10.74	36.0	33.1
1	1	2	1086	5.5	4.8	13.9	53	3.0	1.1	7.0	11.45	40.0	38.9
1	1	3	1088	5.3	4.6	12.4	49	3.3	0.9	7.3	11.93	35.0	38.7
1	1	4	1089	5.5	4.8	14.5	47	2.6	1.0	6.9	10.81	35.0	36.4
2	2A	1	1065	5.7	5.0	14.0	59	3.5	1.3	6.4	11.49	38.0	44.0
2	2A	2	1053	5.3	4.6	17.0	45	3.1	1.0	7.6	12.00	40.0	36.5
2	2A	3	1062	5.4	4.7	12.2	54	3.3	0.8	6.4	10.78	32.0	40.9
2	2A	4	1057	5.4	4.7	13.4	51	3.3	1.2	6.9	11.61	35.0	40.2
3	2B	1	1066	5.6	4.9	15.3	58	3.4	1.2	5.9	10.71	35.0	44.5
3	2B	2	1054	5.5	4.8	13.3	48	3.2	1.1	7.3	11.84	37.0	38.3
3	2B	3	1061	5.3	4.6	15.4	49	2.4	1.0	7.5	11.13	32.0	32.6
3	2B	4	1058	5.6	4.9	18.8	53	3.3	1.1	6.7	11.28	33.0	40.7
4	3A	1	1052	5.6	4.9	15.9	53	3.5	1.2	7.2	12.11	36.0	40.6
4	3A	2	1063	5.6	4.9	17.8	61	3.0	1.0	5.6	9.92	34.0	43.3
4	3A	3	1056	5.4	4.7	11.2	49	2.6	1.0	7.1	10.83	34.0	34.7
4	3A	4	1060	5.6	4.9	15.5	53	3.7	1.4	6.9	12.40	37.0	44.3
5	3B	1	1051	5.6	4.9	11.2	47	3.1	1.2	6.9	11.50	36.0	39.7
5	3B	2	1064	5.6	4.9	16.6	57	3.1	1.0	7.1	11.39	40.0	37.4
5	3B	3	1055	5.2	4.5	16.2	54	3.2	1.0	6.8	11.32	32.0	39.8
5	3B	4	1059	5.6	4.9	13.0	52	3.1	1.4	7.1	11.77	38.0	39.9
6	4A	1	1099	5.4	4.7	15.2	59	2.5	0.8	7.6	11.24	34.0	32.7
6	4A	2	1111	5.6	4.9	16.2	70	3.3	1.3	6.8	11.66	33.0	42.1
6	4A	3	1110	5.5	4.8	14.6	61	3.3	1.0	6.9	11.42	35.0	39.8
6	4A	4	1106	5.5	4.8	12.7	59	2.9	1.1	6.4	10.72	32.0	40.6
7	4B	1	1100	5.5	4.8	12.4	68	3.0	1.1	7.4	11.70	34.0	37.0
7	4B	2	1112	5.6	4.9	11.9	61	3.1	1.2	5.6	10.13	35.0	45.0
7	4B	3	1109	5.3	4.6	13.5	65	3.1	1.2	7.9	12.51	34.0	36.5
7	4B	4	1105	5.3	4.6	11.8	64	3.1	0.9	6.5	10.76	34.0	39.6
8	4C	1	1113	5.5	4.8	13.2	66	3.0	1.1	6.4	10.71	35.0	39.9
8	4C	2	1101	5.6	4.9	14.2	73	3.3	1.3	6.7	11.57	34.0	42.2
8	4C	3	1104	5.3	4.6	14.2	65	3.5	1.2	6.7	11.66	35.0	42.6
8	4C	4	1108	5.4	4.7	12.7	62	3.5	1.1	6.3	11.07	33.0	43.0
9	4D	1	1114	5.1	4.4	13.4	55	2.6	0.9	6.1	9.89	32.0	38.7
9	4D	2	1102	5.4	4.7	12.4	62	2.8	1.1	7.4	11.52	35.0	36.0
9	4D	3	1103	5.5	4.8	14.0	66	3.0	1.1	7.1	11.41	34.0	38.0
9	4D	4	1107	5.5	4.8	12.5	67	3.2	1.0	5.9	10.33	34.0	43.2
10	5A	1	1082	5.5	4.8	14.6	65	2.7	1.0	6.8	10.70	34.0	36.9
10	5A	2	1079	5.5	4.8	15.8	61	3.1	1.2	7.4	12.04	39.0	38.2
10	5A	3	1077	5.4	4.7	15.0	61	3.0	1.0	6.3	10.61	30.0	40.5
10	5A	4	1076	5.4	4.7	14.3	63	2.3	0.9	7.3	10.79	29.0	32.8
11	5B	1	1081	5.7	5.0	12.2	70	3.5	1.4	6.4	11.63	40.0	44.6
11	5B	2	1080	5.5	4.8	16.2	67	3.4	1.3	6.7	11.61	37.0	42.4
11	5B	3	1078	5.5	4.8	11.6	68	2.5	0.9	6.4	10.15	33.0	37.3
11	5B	4	1075	5.6	4.9	12.6	65	3.1	1.2	5.9	10.39	40.0	43.5
12	6A	1	1115	5.3	4.6	15.7	64	2.9	1.0	6.9	11.01	34.0	37.6
12	6A	2	1118	5.4	4.7	15.3	62	2.7	1.0	5.8	9.76	35.0	41.1
12	6A	3	1125	5.6	4.9	12.7	57	3.2	0.9	6.9	11.25	33.0	38.3
12	6A	4	1123	5.4	4.7	15.2	66	2.6	1.0	7.4	11.31	38.0	34.8
13	6B	1	1129	5.6	4.9	12.8	65	2.6	0.9	5.2	8.98	34.0	42.0
13	6B	2	1127	5.7	5.0	12.2	69	3.2	1.4	6.2	10.96	36.0	43.4
13	6B	3	1119	5.7	5.0	14.7	57	2.9	1.1	4.8	8.96	35.0	46.0
13	6B	4	1124	5.4	4.7	12.9	62	2.8	1.0	6.8	10.91	31.0	37.6

Continuing …

T#	T#	Rep	Plot#	Soil pH		P	K	Ca	Mg	H	CEC	OM	BS
				H_2O	$CaCl_2$	mg/dm^3		cmol$_c$/dm^3				g/kg	%
14	7A	1	1116	5.6	4.9	14.9	71	3.5	1.2	5.8	10.66	33.0	46.1
14	7A	2	1128	5.5	4.8	13.6	58	3.6	1.2	5.6	10.54	32.0	47.1
14	7A	3	1120	5.6	4.9	12.8	74	3.3	1.1	5.8	10.38	34.0	44.6
14	7A	4	1122	5.8	5.1	15.2	70	3.3	1.0	6.5	10.99	33.0	40.9
15	7B	1	1130	5.5	4.8	14.0	63	3.4	1.1	6.3	10.95	35.0	42.9
15	7B	2	1117	5.5	4.8	13.3	57	3.2	1.2	6.0	10.55	35.0	43.1
15	7B	3	1126	5.8	5.1	14.1	71	3.4	1.2	6.8	11.52	34.0	41.4
15	7B	4	1121	5.5	4.8	13.8	53	3.2	1.2	5.5	10.01	31.0	45.0
16	8A	1	1131	5.4	4.7	13.7	66	2.9	0.9	5.3	9.32	36.0	43.7
16	8A	2	1134	5.5	4.8	13.2	64	3.1	1.2	7.1	11.57	33.0	38.9
16	8A	3	1135	5.4	4.7	13.9	65	2.7	0.9	6.9	10.67	36.0	35.6
16	8A	4	1140	5.2	4.5	15.6	68	3.1	1.0	8.5	12.77	33.0	33.5
17	8B	1	1146	5.4	4.7	13.2	59	2.7	1.0	6.3	10.11	37.0	37.6
17	8B	2	1144	5.5	4.8	13.2	64	3.0	1.2	6.9	11.33	34.0	39.0
17	8B	3	1142	5.3	4.6	13.9	64	2.8	0.9	7.4	11.35	33.0	35.1
17	8B	4	1137	5.1	4.4	14.3	57	2.7	1.1	6.9	10.82	36.0	36.5
18	9A	1	1132	5.4	4.7	12.8	64	2.7	0.9	6.3	10.06	36.0	37.3
18	9A	2	1143	5.4	4.7	14.6	68	3.4	1.2	6.4	11.29	37.0	43.0
18	9A	3	1141	5.4	4.7	15.5	62	3.4	0.9	6.9	11.48	36.0	39.5
18	9A	4	1138	5.2	4.5	15.2	62	2.9	1.3	6.1	10.52	35.0	42.4
19	9B	1	1145	5.2	4.5	12.5	61	2.5	0.9	6.6	10.26	31.0	35.5
19	9B	2	1133	5.4	4.7	16.2	58	3.0	1.1	7.1	11.45	35.0	37.8
19	9B	3	1136	5.4	4.7	11.9	67	3.2	1.0	6.9	11.36	33.0	38.9
19	9B	4	1139	5.1	4.4	13.8	58	2.5	1.0	6.9	10.76	31.0	35.5
20	11A	1	1098	5.3	4.6	14.5	68	2.6	0.9	6.5	10.27	35.0	36.7
20	11A	2	1085	5.7	5.0	15.0	67	3.8	1.5	6.5	11.97	41.0	45.7
20	11A	3	1094	5.6	4.9	12.7	68	3.3	1.3	6.4	11.28	33.0	42.9
20	11A	4	1092	5.4	4.7	16.0	82	2.3	0.9	6.8	10.38	37.0	34.4
21	11B	1	1084	5.6	4.9	13.4	62	3.3	1.2	6.4	11.18	43.0	42.4
21	11B	2	1095	5.5	4.8	15.2	55	3.4	1.1	7.0	11.68	35.0	40.1
21	11B	3	1087	5.5	4.8	13.6	70	3.0	1.1	6.9	11.24	36.0	38.9
21	11B	4	1091	5.3	4.6	13.5	71	3.1	1.0	7.1	11.56	33.0	38.4
22	11C	1	1097	5.6	4.9	16.9	77	3.4	1.3	7.0	12.05	38.0	41.6
22	11C	2	1096	5.6	4.9	16.5	57	3.1	1.2	6.7	11.15	36.0	40.0
22	11C	3	1093	5.4	4.7	12.8	79	2.8	1.0	6.7	10.86	37.0	38.4
22	11C	4	1090	5.4	4.7	15.2	81	2.8	1.0	7.6	11.67	32.0	34.7
23	12A	1	1068	5.6	4.9	14.7	61	2.8	1.3	6.7	11.05	38.0	39.4
23	12A	2	1069	5.6	4.9	15.9	56	3.6	1.4	7.2	12.33	36.0	41.7
23	12A	3	1072	5.5	4.8	15.2	61	3.0	1.1	6.0	10.37	31.0	42.1
23	12A	4	1073	5.5	4.8	13.2	65	2.6	0.9	5.8	9.74	34.0	40.3
24	12B	1	1067	5.6	4.9	16.5	63	3.2	1.1	6.4	10.92	35.0	41.0
24	12B	2	1070	5.6	4.9	14.0	59	3.2	1.1	7.0	11.63	39.0	39.8
24	12B	3	1071	5.4	4.7	14.7	64	3.1	0.9	7.3	11.50	34.0	37.0
24	12B	4	1074	5.6	4.9	18.7	67	3.5	1.2	6.8	11.78	41.0	42.1

Experimento BPC
Estação Experimental Cachoeira

SAFRA 2011/2012

75,6 m

95 m	6,3 m	6,3 m	6,3 m	6,3 m	6,3 m	6,3 m	6,3 m	6,3 m	6,3 m	6,3 m	6,3 m	6,3 m	
	3 NPK1 1058	**5** NPK2 1059	**24** NPK3 (sup) 1074	**11** NPK4 1075	**22** NPK3 1090	**21** NPK3 1091	**6** NPK3 1106	**9** NPK3 1107	**14** NPK3 1122	**12** NPK3 1123	**18** NPK3 1138	**19** NPK3 1139	9,5 m
	corredor de 3 m												
	2 NPK1 1057	**4** NPK2 1060	**23** NPK3 (2cob) 1073	**10** NPK4 1076	**1** NPK0 1089	**20** NPK3 1092	**7** NPK3 1105	**8** NPK3 1108	**15** NPK3 1121	**13** NPK3 1124	**17** NPK3 1137	**16** NPK3 1140	9,5 m
	corredor de 1 m												
	4 NPK2 1056	**3** NPK1 1061	**23** NPK3 (2cob) 1072	**10** NPK4 1077	**1** NPK0 1088	**22** NPK3 1093	**8** NPK3 1104	**7** NPK3 1109	**14** NPK3 1120	**12** NPK3 1125	**19** NPK3 1136	**18** NPK3 1141	9,5 m
	corredor de 3 m												
	5 NPK2 1055	**2** NPK1 1062	**24** NPK3 (sup) 1071	**11** NPK4 1078	**21** NPK3 1087	**20** NPK3 1094	**9** NPK3 1103	**6** NPK3 1110	**13** NPK3 1119	**15** NPK3 1126	**16** NPK3 1135	**17** NPK3 1142	9,5 m
	corredor de 1 m												
	3 NPK1 1054	**4** NPK2 1063	**24** NPK3 (sup) 1070	**10** NPK4 1079	**1** NPK0 1086	**21** NPK3 1095	**9** NPK3 1102	**6** NPK3 1111	**12** NPK3 1118	**13** NPK3 1127	**16** NPK3 1134	**18** NPK3 1143	9,5 m
	corredor de 3 m												
	2 NPK1 1053	**5** NPK2 1064	**23** NPK3 (2cob) 1069	**11** NPK4 1080	**20** NPK3 1085	**22** NPK3 1096	**8** NPK3 1101	**7** NPK3 1112	**15** NPK3 1117	**14** NPK3 1128	**19** NPK3 1133	**17** NPK3 1144	9,5 m
	corredor de 1 m												
	4 NPK2 1052	**2** NPK1 1065	**23** NPK3 (2cob) 1068	**11** NPK4 1081	**21** NPK3 1084	**22** NPK3 1097	**7** NPK3 1100	**8** NPK3 1113	**14** NPK3 1116	**13** NPK3 1129	**18** NPK3 1132	**19** NPK3 1145	9,5 m
	corredor de 3 m												
	5 NPK2 1051	**3** NPK1 1066	**24** NPK3 (sup) 1067	**10** NPK4 1082	**1** NPK0 1083	**20** NPK3 1098	**6** NPK3 1099	**9** NPK3 1114	**12** NPK3 1115	**15** NPK3 1130	**16** NPK3 1131	**17** NPK3 1146	9,5 m

Appendix C. Field trial layout.