



Evaluation of soluble SOP as K- Source Under Egyptian Agriculture conditions.

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- **Objective:**
- Due to the highest increase in potassium sulfate price (where the price of 50 kg potash fertilizer reached 300 LE at 2009 compared with 45 LE at 1990) this investigation aims to study the possibility of substituting some of soil application with foliar spray to reduce the amounts needed from this fertilizer, and to encourage farmers to use K-fertilizers in their farms.
- Comparing the effect of soluble SOP as foliar spray on the crop production of wheat and rice grain yield comparing with SOP and MOP as soil application

Materials and Methods

A. Series of long-term field trials were conducted at **El-Serw** Res. Station (clay soil) to evaluate the effect of :

- **soluble SOP** as foliar spray 2% (spray twice (500L/ha)= **10 kg K₂O/ha**, the first spray at booting stage, the other two weeks later for wheat and rice plants)
- **potassium sulphate** and **potassium chloride** as soil application (**57.12kg K₂O/ha**)

on the production of **wheat** and **rice** crops

Soil analysis of experimental locations:

locations	El-Serw	El-Sharkia	Damitta	El-Bustan
Soil texture	Clay	Loamy	Clay	Sandy
pH (1:2.5)soil: water	8.3	7.9	8.1	7.6
total soluble salts %	0.3	0.6	0.56	0.20
organic matter %	1.65	1.31	1.72	0.25
available N ppm	32	10.0	39.8	9.5
available P ppm	7.8	15.5	18.8	3.8
available K ppm	450	165	629	114
available Zn ppm	1.4	0.95	0.80	0.30
available Mn ppm	14.6	8.0	6.27	1.3
available Fe ppm	8.4	10.7	15.8	2.1



Results and discussions

**Effect of different sources of potassium on
Wheat grain production(t/ha), relative increase(%) and K-use
efficiency under different soil types, (2006/2007 – 2007/2008)**

k-fertilizer	K₂O kg/ha	Grain yield t/ha	Relative increase%	K-use efficiency
Control	--	6.18	--	--
SOP	57.12	7.00	13.3	14.4 (8.22-21.71)
MOP	57.12	6.82	10.3	11.20 (3.5-16.98)
Soluble SOP as foliar spray twice 2%	10	7.12	15.2	94.75 (42-183)

The data presented is an average of four sites
K-use efficiency (kg grain /kg K₂O fertilizer)

Effect of different sources of K-fertilizer on wheat yield:

- application of K fertilizers increased grain and straw yield of wheat, with superiority to soluble SOP
- relative increase in grain yield reached **15.2%** (related to the control) (as an average across various sites).
- foliar spray of soluble SOP was more economically benefit, where every **one kg** of **k_2O** induced an increase in **grain** yield reached **94.7 kg** (as an average of various sites)

Effect of different sources of K-fertilizer on rice yield:

k-fertilizer	K ₂ O kg/ha	Grain yield t/ha	Relative increase %	K-use efficiency
control	0.0	9.00	--	--
SOP	57.12	9.63	7.88	11.03 (6.3-14.48)
MOP	57.12	9.56	6.22	9.80 (4.55-9.98)
Soluble SOP as foliar spray twice 2%	10	9.71	8.01	71.71 (51-109)

The data presented is an average of seven sites
K-use efficiency (kg grain /kg K₂O fertilizer)

Effect of different sources of K-fertilizer on rice yield:

- Application of various K-fertilizers increased rice grain yield with no significant differences between various K- sources
- the highest relative increase in rice grain yield (7.88%) was obtained by the application of soluble SOP
- application of one kg K_2O as soluble SOP, induced an increase ranged between (51 to 109 kg rice grain), while for SOP the increased rice grain ranged between (6.3-14.18 kg), corresponding values for MOP were (4.55- 9.98 kg rice grain/ 1 kg K_2O).

B. field trails were conducted in the farmer's fields To evaluate the effect of

- foliar spray with 10 kglha soluble potassium
- control (without K-fertilizer)

At **Damiatta** (clay soil);
El-Sharkia (Loamy soil)
El-Bustan (Sandy soil) } (10 trails for wheat)

At **Damiatta** (clay soil);
El-Sharkia (Loamy soil) } (18 field trails for rice)

Effect of Soluble SOP on **wheat grain** yield in **farmers field** :

- at **El-Serw** (which represented the clay soils, foliar spray of **2% soluble SOP** induced an increase in wheat grain yield reached **940 kg/ha** (about **15.6%**) over the control (as an average of the three growing seasons,)),
- while at **Sharkia** (loamy soil), the average increase in wheat grain yield during the three growing seasons was **310 kg/ha** only (about **5.2%**) compared to the control.
- In sandy soil (**El-Bustan**) the response to soluble SOP application was also little bit low as the increase in grain yield reached only **560 kg/ha (9.4%)**, over the control.

Effect of soluble SOP as foliar spray on **wheat grain yield (t/ha)** under different soil types in demonstration field trails

Location	El-Serw (clay)	Sharkia (loamy)	El-Bustan (sandy)
0 K ₂ O	6.03	5.98	5.94
Foliar spray 2% 10 kg K ₂ O/ha	6.97	6.29	6.50
Increase in t/ha	0.94	0.31	0.56
K-use efficiency kg grain/kg K ₂ O	94	31	56

The data presented is an average of the farms at each location

Effect of soluble SOP as foliar spray on **rice grain** yield in farmers field:

- at clay soil (**El-Serw**) the average increase across four growing seasons (2006-2009) reached **1.11 t/ha (12.7%)** over the control, while the corresponding value for loamy soil (at **El Sharkia**) was **0.81ton/ha (8.6%)**.
- every **one kg of K_2O** applied as soluble SOP induced an increase reached **93.33 kg rice grain** (as an average of different sites and years).
- at El-Sharkia the increase were, **80.13 kg rice grain/kg K_2O**

Effect of soluble SOP as foliar spray on **rice grain yield (t/ha)** and **K-use efficiency** under different soil types in Demonstration field trails

	El-Serw (clay soil)	El Sharkia (loamy soil)
0 K ₂ O	8.73	9.37
Foliar spray 2% 10 kg K ₂ O/ha	9.84	10.18
K-use efficiency	111(51-191)	81(29-128)
The data preseted is an average of	9 trails	8 trails

K-use efficiency =kg grain/ kg K₂O

• **Conclusion:**

- Rice and wheat grain and straw yields significantly increased by application of SOP, MOP and Soluble SOP with superiority of Soluble SOP foliar spray.
- K-use efficiency (in kg grain / kg K₂O) of SOP, MOP and soluble SOP was 14.48, 11.20 and 94.75 ;for wheat grain yield and 11.03, 9.08 and 71.71 for rice grain yield respectively.
- foliar spray of soluble SOP was more economically benefit than soil application of either SOP or MOP

- In spite of the highest increase in potash fertilizer price (where the price of 50 kg SOP reached 300 LE in 2009 compared with 45 LE in 1990); the amount consumed raised from 7.5 thousand tones in 1980 to 29.7 in 1990 and reached 55 thousand tones in 2008 ; due to the efforts of the project team on increasing the potassium culture by Egyptian farmers as well as the Arabic countries

