EFFECT OF DIFFERENT APPLIED POTASSIUM SOURCES ON QUANTITY AND QUALITY OF GROUNDNUT CROP GROWN UNDER NEWLY RECLAIMED SANDY SOIL CONDITIONS

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ABSTRACT:

A field experiment was conducted on a newly reclaimed sandy soil at the Experimental Farm of Ismaellia Agriculture Research Station during a summer season of 2009 to study the effect of applied potassium sulfate, as a mineral fertilizer, alone and its integrated with different K-sources, *i.e.,* vinasse (by-product of sugarcane complementary industries) and wood ashes on groundnut yield and its components, *i.e.,* chemical constituents (*i.e.,* macro and micro nutrients uptake by both hays and seeds) and biochemical ones (*i.e.,* seed protein, oil and its components of fatty acids). The effect of different applied K-sources on some soil properties was taken into consideration in the current study.

The obtained results show that application of the tested K-sources led to a significant increase for each of the studied plant parameters (*i.e.,* weight of 100 seed in g, weight of pods in kg fed^{-1}, hay and seed yields in kg fed^{-1}), chemical constituents (*i.e.,* macro and micro nutrients uptake by both hays and seeds) and biochemical ones (*i.e.,* seed protein, oil and its components of fatty acids). Whilst the application of the tested K-sources had a greater effect on the aforementioned plant parameters, particularly the combined treatments of potassium sulfate integrated with vinasse followed by wood ashes, which were recorded the greatest values, and potassium sulfate fertilizer alone.

As for response of soil properties to the applied treatments, the obtained data reveal that the combined treatments of potassium sulfate integrated with either vinasse or wood ashes resulted in a significant decrease in each of soil pH and ECe values vs a significant increase in each of soil content of organic matter and available nutrients of N, P and K. Thus, it could be recommended that application of potassium sulfate as a mineral fertilizer integrated with either vinasse or wood ashes as combined treatments can be used for maximizing the profitability of potassium sulfate in such newly reclaimed sandy soils, and in turn increasing the yield of groundnut seeds and improving its quality.

Key words: Groundnut crop newly reclaimed sandy soils, vinasse, wood ashes, soil properties and K-sources.

INTRODUCTION:

Potassium is one of sixteen essential nutrients required for plant growth and reproduction, and it is classified as a macronutrient, such as either

nitrogen or phosphorus **(Marschner, 1995)**. Potassium is not a constituent of any plant structures or compounds. It plays a part in many important regulatory roles in the plant, it is essential in nearly all processes needed to sustain plant growth and reproduction. Also, potassium plays a vital role in; translocation of photosynthesis products, protein synthesis, control of ionic balance, regulation of plant stomata and water use, activation of plant enzymes and many other processes **(Krauss and Jiyun, 2000)**.

Soil is an important factor and foundation for agricultural production. In Egypt, more desert areas either sandy or calcareous in nature have to be put under cultivation. Such soils are poor with respect to their physico-bio-chemical properties, soil water-plant relationships as well as their nutritional status.

Groundnut (*Arachis hypogaea* L.) is one of the most important summer legume crops cultivate in sandy soils of Egypt. It is used as whole seed or as food, and the green plants are used as either a high quality for animal feed or a green manure. Being a leguminous crop, it can fix atmospheric nitrogen in soil through root nodule bacteria and thus improves soil fertility. Moreover, groundnut seeds contain about 50 % oil and 22-30 % protein.

The response of different crops to K-fertilizers was evaluated by some researchers, such as **Abd El-Hadi *et al.* (1990)** who found that addition of potassium sulfate (SOP) increased the production of most field crops. **Faizy (1997)** found that the yield and quality of cotton, maize and rice grains increased with the addition of SOP. Under desert conditions, **El-Kadi (1997)** reported that wheat, corn, and sugar beet responded to K application. In Teheran, **Malakouti (1997)** found that the introduction of high yielding varieties potato, sugar cane and sugar beet responded to K application. Also, **Tisdale *et al*. (2002)** showed that K plays an important role in improving the grain protein content of wheat probably by enhancing the N-use efficiency.

Aramrak *et al.* (2007) reported that groundnut grown on sandy soils, which are mostly deficient in potassium. For correcting such a deficiency, potassium fertilizer was applied to these soils. In recent years, interest in the utilization of organic waste materials as a source of plant nutrients that have markedly increased, due to the high cost of chemical fertilizers and waste disposal problems. Vinasse is a by-product of sugar cane complementary industries, as it is produced from the fermentation of molasses and it can be used as a source of potassium. **Gomez and Rodriguez (2000)** found that the application of vinasse would substitute for 55% of N, 72% of P_2O_5 and 100 % of the K_2O required for sugar cane crop in Venzuela. **Arafat and Yassen (2002)** concluded that application of vinasse increased crop because it is a good source of many of nutrients which plants needed to growth.

Wood ashes are an excellent source of potassium, however, burning of wood drives away all of carbon and leaves an ash that is usually more than 5 % K_2O. **Priyadharshini and Seran (2009)** found that the application of paddy husk ash at the rate of 4.5 tons/ha is suitable for obtaining high yield of

cowpea in a sandy soil. **Mittra *et al.* (2005)** reported that wood ash and fly ash could be used as sources of plant nutrients for crop production.

Hence, this work was carried out at identifying the effect of either vinasse or wood ashes combined with potassium sulfate as a mineral fertilizer versus a potassium sulfate alone, as conventional K-sources on seed quantity or quality, status of some macro and micro nutrients of groundnut crop grown on a newly reclaimed sandy soil as well as their positive effects on some soil properties.

MATERIALS AND METHODS:

A field experiment was conducted on a newly reclaimed sandy soil at the Experimental Farm of Ismaellia Agriculture Research Station during a summer season of 2009. Some initial physical and chemical characteristics of the studied experimental soil as well as the used vinasse and wood ashes, which were determined according to **Black *et al.* (1965) and Page *et al.* (1982)**, are presented in Tables (1 and 2).

Table (1): Some characteristics of the studied experimental soil at initial state.

Soil character	Value	Soil character	Value
Particle size distribution %:		pH (1: 2.5 ,soil suspension)	7.70
Sand	92.1	*Chemical analysis of soil paste extract:*	
Silt	2.2	ECe (dS m^{-1})	1.55
Clay	5.7	*Soluble cations (m molc L^{-1}):*	
Textural class	Sandy	Ca^{++}	5.50
$CaCO_3$ content %	1.40	Mg^{++}	3.95
Organic matter content %	0.08	Na^{+}	6.10
Available N (mg kg^{-1})	11.7	K^{+}	0.45
Available P (mg kg^{-1})	2.81	*Soluble cations (m molc L^{-1}):*	
Available K (mg kg^{-1})	40.00	CO_3^{--}	0.00
Available Fe (mg kg^{-1})	3.60	HCO_3^{-}	2.40
Available Mn (mg kg^{-1})	0.52	Cl^{-}	5.20
Available Zn (mg kg^{-1})	0.45	SO_4^{--}	8.40

Table (2): Some chemical properties of the vinasse and wood ashes

Material properties	Vinasse	Wood ashes
pH (1:5 ,soil suspension)	4.11	9.43
ECe (dS m^{-1}, water extract 1:5)	5.30	4.20
Organic matter content %	46.49	Nil
Total nitrogen %	1.41	0.05
Total phosphorus %	0.25	0.47
Total potassium %	1.14	7.00
Total calcium %	0.89	8.50
Total iron (mg kg^{-1})	8798	4842
Total manganese (mg kg^{-1})	458	356
Total zinc (mg kg^{-1})	262	125
Total copper (mg kg^{-1})	12	52

A randomized complete block design with six treatments and three replicates was carried out. Plot area was 3.0 x 3.5 m. Vinasse and wood ashes as sources of potassium were applied to soil as basal treatment for K-sources. Treatments in this experiment were as follows:

Treatment symbol	Applied fertilizer fractions
T1	The control treatment.
T2	60 kg N/fed as ammonium nitrate+ 30 kg P_2O_5 /fed as calcium super phosphate + 48 kg K_2O/fed as potassium sulfate.
T3	60 kg N/fed as ammonium nitrate+ 30 kg P_2O_5 /fed as calcium super phosphate + 24 kg K_2O/fed as potassium sulfate + 24 kg K_2O/fed as vinasse.
T4	60 kg N/fed as ammonium nitrate+ 30 kg P_2O_5 /fed as calcium super phosphate + 24 kg K_2O/fed as potassium sulfate + 24 kg K_2O/fed as wood ashes.

Nitrogen fertilizer was applied in three equal doses, *i.e.,* at sowing, 30 and 60 days from plantation date. Fertilizers of phosphorus as a calcium super phosphate (15 % P_2O_5) and potassium sulfate (48 % K_2O) were added during the seed bed preparation. Also, gypsum at a rate of 500 kg/fed was added during the seed bed preparation. Seeds of groundnut (*Arachis hypogea*, cv. Giza 5) were inoculated just before sowing with the specific rhizobium bacteria inoculants and were sown in hill 10 cm apart in ridges at a spacing of 60 x 30 cm. The normal cultural practices for groundnut crop were applied as recommended in the area under consideration. Sprinkler irrigation was applied as plant needed for soil moisture.

At harvest the yield and its components were recorded. All plants of each plot were harvested to determine number of pods as well as hay, pod and seed yields. Also, the nutrient contents of N, P, K, Fe, Zn and Mn uptake by groundnut hays and seeds were determined according to **Chapman and Pratt (1978)**. Crude protein % was calculated by multiplying N % by 6.25 **(Deyoe and Shellenberger, 1965)**. Seed oil content and its component of fatty acids were determined according to **A.O.A.C. (1980).** The obtained data were subjected to statistical analysis, which were performed by using the **MSTAT Statistical Package (1990)**.

RESULTS AND DISCUSSION:

I. Effect of different applied potassium sources on some plant parameters:

Data in Table (3) presented the effect of different applied potassium sources on some plant parameters at harvest stage of groundnut crop, *i.e.,* 100 seed weight, weight of pods as well as hay and seed yields. Results showed that all the studied parameters were significantly increased by application of the tested different K-sources. Also, the obtained data showed that the application of potassium sulfate fertilizer integrated with either vinasse or wood ashes, particularly as combined treatments, were more significantly effective on the studied plant parameters of groundnut crop at harvest stage. Results also emphasized that the greatest values of 100 seed weight, weight of pods as well as hay and seed yields were recorded with plants received the

treatment of T4 (24 kg K_2O/fed as potassium sulfate + 24 kg K_2O/fed as wood ashes). However, the lowest values of the corresponding plant parameters were recorded with those fertilized by the treatment of T2 (48 kg K_2O/fed potassium sulfate fertilizer alone). The beneficial effects of the combined treatments might be due to the stimulation integration between potassium sulfate fertilizer and either wood ashes or vinasse application on improving the physicochemical properties of the experimental soil, and in turn increasing soil fertility and enhancing the availability of many essential plant nutrients to plant uptake. Such favourable conditions were positively reflected on improving the vegetative growth of groundnut plants as well as increasing the hay and seed yields. Also, this simulative effect may be due to the role of potassium on production of enzyme activity and enhanced translocation of assimilative and photosynthesis **(El-Desuki *et al*., 2006)**.

Table (3): Effect of different applied potassium sources on some plant parameters at harvest stage of groundnut crop.

Treatments	Weight of 100 seed (g)	Weight of pods (kg/fed)	Hay yield (kg/fed)	Seed yield (kg/fed)
T1 (Control)	56.2	622.0	588.9	382.0
T2	84.6	1288.0	1509.0	938.0
T3	90.3	1495.0	1610.0	1135.0
T4	93.8	1512.0	1771.0	1152.0
L.S.D. at 0.05	1.43	6.69	2.27	3.11

In addition, these results are in agreement with the findings of **Seripong (1988**) who concluded that phosphorous and paddy husk ash improved nodulation, yield and some soil properties of Thailand soils. **Okon *et al.* (2005)** stated that the optimum level of rice husk ash plus 0.05 ton urea per ha can sustain rapid growth and better yield of okra even faster than NPK, because rice husk ash contains almost all other essential plant nutrients and the presence of nitrogen will boost their uptake. **Singh *et al*. (2002)** reported that improved water use efficiency in soil and higher yield of wheat crop can be achieved when soil amended by fly ash. **Priyadharshini and Seran (2009)** concluded that application of paddy husk ash as a source of potassium at a rate of 4.5 tons/ha are favorable for yield advancements in cowpea.

II. Chemical constituents of groundnut plants:

a. Macronutrients of N, P and K uptake by hay and seed yields:

Data in Table (4) showed that the values of macronutrients (N, P and K) uptake by groundnut plant organs, *i.e.,* hays and seed were significantly increased due to the application of different K-sources as compared to the control treatment (T1). The obtained data showed that application of either vinasse or wood ashes combined to potassium sulfate recorded the greatest values of N, P and K uptake by both hays and seeds of groundnut as compared with applied potassium sulfate fertilizer alone.

Table (4): Effect of different applied potassium sources on N, P and K uptake by hay and seed yields of groundnut crop.

Treatments	Macronutrients uptake (kg/fed)					
	Hays			Seeds		
	N	P	K	N	P	K
T1 (Control)	7.06	1.20	7.65	9.55	2.50	7.64
T2	20.37	2.30	21.12	32.83	4.60	28.14
T3	22.70	3.50	25.50	45.40	5.70	36.32
T4	26.21	3.90	28.74	51.84	4.90	39.16
L.S.D. at 0.05	1.04	0.07	2.28	7.61	0.12	1.56

Also, data revealed that the combined treatment of T4 (potassium sulfate + wood ashes) was the most superior one for the nutrients of N, P and K uptake by hays and seeds followed by T3 (potassium sulfate + vinasse), whereas the treatment of T2 (potassium sulfate individually) was the usefulness one for all N, P and K uptake. These favourable conditions could be explained by a fact that the total amount of K, which added from either vinasse or wood ashes along the growing period, was sufficient to meet the K required for groundnut plants. A similar finding was obtained by **Ayeni (2008)** who found that combined of cocoa pod ash and NPK fertilizer increased N, P, K, Ca and Mg uptake by tomato plants. **Arafat and Yassen (2002)** reported that the addition of vinasse increased the uptake of nitrogen, phosphorus and potassium. Wood ash increased the K concentration in corn and winter wheat (*Triticum aestivum* L.) in greenhouse studies **(Erich, 1991)**.

b. Micronutrients of Fe, Zn and Mn uptake by hay and seed yields:

Data presented in Table (5) indicated that the application of potassium sulfate alone and its combination with either vinasse or wood ashes increased the values of Fe, Zn and Mn uptake by both hay and seed yields **of** groundnut crop as compared to the control treatment.

Table (5): Effect of different applied potassium sources on Fe, Zn and Mn uptake by hay and seed yields of groundnut crop.

Treatments	Micronutrients uptake (g/fed)					
	Hays			Seeds		
	Fe	Zn	Mn	Fe	Zn	Mn
T1 (Control)	54.40	27.20	23.60	38.00	24.20	18.00
T2	81.90	68.00	43.00	47.00	42.10	23.99
T3	124.20	98.40	78.54	85.00	60.76	45.67
T4	102.00	92.80	72.40	83.23	57.59	39.79
L.S.D. at 0.05	1.68	0.08	0.06	1.83	0.26	0.09

The greatest values of Fe, Zn and Mn uptake by both hays and seed were obtained by application of potassium sulfate combined with vinasse, however, the relative increase percentages reached 128.30 and 123.68 % for Fe, 261.76 and 151.07 % for Zn and 232.79 and 153.72 % for Mn, respectively, over the control treatment. These results may be due to the application of vinasse

enhanced some soil chemical properties, and consequently such profitable conditions positively reflected on the micronutrients availability and uptake by plant organs. These obtained data are in harmony with those reported by **Bhanooduth (2006)** who found that addition of wastes from sugar industry like vinasse or burning of sugar cane bagasse to soil increase availability of Fe, Zn and Mn in the soil.

III. Oil and protein contents % of seed groundnut:

Data in Table (6) show that the oil and protein contents of groundnut seeds were increased under all applied treatments as compared to the control one. The greatest values of both oil and protein contents were obtained by plants received the treatment of T4 (60 kg N/fed as ammonium nitrate+ 30 kg P_2O_5 /fed as calcium super phosphate + 24 kg K_2O/fed as potassium sulfate + 24 kg K_2O/fed as wood ashes). These results may be due to the application of potassium enhanced of N-uptake, and consequently improved the protein synthesis. **Anuradha and Sharma (1995)** found that the application of potassium increased the chlorophyll content, nitrate reductase activity, seed protein and oil content in soybean. **Deshmukh *et al.* (1994)** reported that the highest soybean yield and oil content with an application of 60 kg K_2O/ha at Amravati and 90 kg K_2O/ha at Akola in Maharashtra State. **Shahid et al. (1999)** found that potassium application improved the crop harvest index and grain quality parameters (protein and oil contents) of boldness.

Table (6): Effect of different applied potassium sources on oil and protein contents in seeds of groundnut.

Treatments	Seed content %		Seed total yield (kg/fed)	
	Oil	Protein	Oil	Protein
T1 (Control)	43.30	15.62	165.40	59.66
T2	45.00	21.87	422.10	205.14
T3	47.00	25.00	533.50	283.75
T4	49.20	28.12	578.10	323.94
L.S.D. at 0.05	0.84	1.05	2.93	11.87

Also, **Shafeek *et al.* (2005)** reported that potassium plays an important role in many biochemical processes such as photosynthesis, respiration, protein and carbohydrates metabolism.

IV. Fatty acid components of groundnut seed oil:

Data in Table (7) indicated that application of potassium sulfate alone or combined with either vinasse or wood ashes resulted in a pronounced decrease of total saturated fatty acids (*i.e.,* lauric, myristic, palmitic, stearic, erachidic and behenic) as compared to the control treatment. Contrary, the lowest values of total unsaturated fatty acids were obtained by application of T3 (60 kg N/fed as ammonium nitrate+ 30 kg P_2O_5 /fed as calcium super phosphate + 24 kg K_2O/fed as potassium sulfate + 24 kg K_2O/fed as vinasse). Regarding the effect of different treatments on unsaturated fatty acids, data showed that all applied treatments caused an increase for the total unsaturated fatty acids as

compared to the control treatment. Oleic and linoleic were the dominated of the component of unsaturated fatty acids. However, the applied treatments of T3 followed by T4 were recorded the greatest values of unsaturated fatty acids as compared to the potassium sulfate alone. **Mekki *et al.* (1999)** stated that application of potassium fertilizer increased the oleic and linoleic component of unsaturated fatty acids of sunflower seeds.

Table (7): Effect of different applied potassium sources on seed oil components of fatty acids.

Seed oil components (fatty acids)	Applied treatments			
	T1 (Control)	T2	T3	T4
Lauria	6.21	3.9	0.00	1.33
Myristic	1.25	0.9	0.80	0.31
Palmitic	4.21	7.1	5.8	3.91
Stearic	3.65	2.5	3.6	4.25
Arachidic	3.80	1.5	1.8	2.40
Behenic	2.54	2.4	0.1	1.54
Total saturated fatty acids	21.66	17.93	11.3	13.74
Palmitoleic	2.30	1.30	1.3	1.64
Oleic	40.54	45.25	55.2	56.32
Linoleic	24.21	23.03	27.8	27.37
Linolenic	9.65	11.75	1.85	1.64
Erucoic	0.98	0.98	0.88	0.25
Total unsaturated fatty acids	77.68	82.31	87.76	86.97

These results may be due to the beneficial effect of applied of potassium on increasing total unsaturated fatty acids which play an activator of many enzymes processes where some of these enzymes may affect the seed oil components. **Zakaria *et al*. (2005**) found that application of potassium caused an increase for seed oil content and total unsaturated fatty acids (oleic and linoleic), while the total saturated fatty acids were decreased.

V. Some soil chemical properties and nutrients status at harvest stage of groundnut crop:

Data presented in Table (8) indicated that application of different treatments caused an alternative pattern for each of the studied soil chemical properties (*i.e.*, pH, ECe, organic matter content and available nutrients of N, P and K). The obtained results revealed that pH values at harvest stage of groundnut plants, were more affected due to the different applied treatments. Vinasse combined with potassium sulfate (T3) seemed to be the most pronounced effect on reducing soil pH values. The reduction in soil pH value might be attributed to the effect of the applied vinasse, which contains a high amount of active organic acids and its less pH value (4.11). These results are in accordance with results of **Adel and Mohsen (2008)** who found that application of vinasse to a newly reclaimed loamy sand soil caused a significant decrease in soil pH. Concerning the soil salinity (ECe), data presented in Table (8) showed a significantly decrease in ECe values of the

soil paste extract due to application of different treatments. The positive affects of either applied vinasse or wood ashes combined with potassium sulfate may be due to the removed soluble salts that associated with the agricultural management practices.

Table (8: Effect of different applied potassium sources on some soil chemical properties and nutrients status at harvest stage of groundnut crop.

Treatment	Soil chemical properties			Available macronutrient contents (mg/kg)		
	pH (1:2.5)	ECe (dS/m)	Organic matter%	N	P	K
T1 (Control)	7.5	1.15	0.10	18.21	2.52	47.00
T2	7.2	0.83	0.14	20.25	3.14	71.05
T3	7.1	0.92	0.21	32.21	5.68	96.00
T4	7.3	0.95	0.13	22.31	4.12	84.70
L.S.D. at 0.05	0.18	0.15	0.03	1.18	0.35	8.08

As for soil organic matter content, data in Table (8) showed that its content tended to significant increased due to the application of the different applied treatments, particularly the treatment of vinasse combined with potassium sulfate. **Devarajam *et al.* (1996)** reported that the significant increase in the organic matter content of the soils with vinasse could be attributed to the high organic load of the vinasse. Moreover, data in Table (8) reveal that all the applied treatments could result in higher available N, P and K contents in soil as compared with the control treatment. The treatment of potassium sulfate combined with vinasse caused significant increase in the contents of N, P and K in the experimental soil at the harvest stage of groundnut crop. This finding is more attributed to the higher nutritive value of vinasse. Also, the application of the by-product of vinasse to the soil increased soil microbial biomass and mineralization of its organic matter, and consequently increased N-NO_3 content in the soil. **Meena *et al.* (1986)** stated that the vinasse application to soil increased the total N and organic matter content. **Arafat and Yassen (2002)** found that the residual available N, P and K and organic matter in soil after wheat harvesting, generally, increased with increasing rates of vinasse applied.

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تأثير إضافة مصادر مختلفة من البوتاسيوم على كمية ونوعية محصول الفول السودانى النامى تحت ظروف أرض رملية حيثة الإستصلاح

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أجريت تجربة حقلية على أرض رملية مستصلحة حديثا بمزرعة التجارب – محطة البحوث الزراعية بالإسماعلية خلال الموسم الصيفى لعام ٢٠٠٩، لدراسة تأثير إضافة كبريتات البوتاسيوم - كسماد معدنى – بصورة منفردة أو مشتركة مع مصادر مختلفة للبوتاسيوم ممثلة فى الفيناس (أحد المنتجات الهامشية للصناعات التكاملية لقصب السكر) ورماد الأخشاب على محصول الفول السودانى ومكوناته ممثلة فى محتوى البذور والعرش من المغذيات الكبرى والصغرى، محتوى البذور من البروتين والزيت ومكوناته من الأحماض الدهنية. كما وأن تأثير إضافة مصادر البوتاسيوم المختلفة على بعض خصائص التربة قد أخذ فى الإعتبار بالنسبة لهذه الدراسة.

وتوضح نتائج الدراسة المتحصل عليها أن إضافة مصادر البوتاسيوم المختبرة قد أدى إلى زيادة معنوية فى كل من القياسات النباتية المدروسة (وزن ١٠٠ بذرة بالجرام، وزن القرون بالكيلو جرام/فدان، وزن محصولى البذور والعرش بالكيلو جرام/فدان)، بالإضافة إلى محتوى البذور والعرش من المغذيات الكبرى والصغرى، محتوى البذور من البروتين والزيت ومكوناته من الأحماض الدهنية، حيث أن مصادر البوتاسيوم المختبرة قد أظهرت تأثيرات عظيمة على القياسات النباتية المشار إليها سابقا خاصة فى حالة المعاملات المشتركة لسماد كبريتات البوتاسيوم مع الفيناس يليها مع رماد الأخشاب - والتى سجلت أعلى القيم – ثم سماد كبريتات البوتاسيوم بصورة منفردة.

وبالنسبة لإستجابة خصائص التربة للمعاملات المطبقة، فان النتائج المتحصل عليها تشير إلى أن المعا ملات المشتركة لسماد كبريتات البوتاسيوم سواء مع الفيناس أو مع رماد الأخشاب قد تسببت فى نقص معنوى لقيم كل من Soil pH والتوصيل الكهربى (ECe) لمستخلص عجينة التربة المشبعة مقابل زيادة معنوية فى محتوى التربة من المادة العضوية والجزء الميسر من مغذيات N, P and K. ولذا يمكن التوصية بان إضافة كبريتات البوتاسيوم كسماد معدنى مندمجا مع الفيناس أو رماد الأخشاب كمعاملة مشتركة يمكن إستخدامه لتعظيم الفائدة من كبريتات البوتاسيوم فى الأراضى الرملية المستصلحة حديثا، ومن ثم زيادة إنتاجية محصول البذور من الفول السودانى وتحسين جودتها.