

(1)

(5:1) (2:1) (PR:S)

(8:1)

(2:1) (5:1) (8:1) (PR:S)

%86 %76 %50

.Rye grass

pH

pH

:

Study of the Relative Agronomic Effectiveness of a Syrian Phosphate Rock, and the Effect of Mixing with Different Ratios of Elemental Sulfur

L. Habib⁽¹⁾

ABSTRACT

A pot experiment was conducted to evaluate the relative agronomic effectiveness (RAE%) of a Syrian phosphate rock when it is added alone and as mixture with elemental sulfur with three different ratios (PR:S) (2:1) (5:1) (8:1) and compared with triple superphosphate. The main results of this study showed that Ain Layloun phosphate rock was not effective for direct use by Rye grass when used alone, but it became effective when mixed with elemental sulfur. The relative agronomic effectiveness was varied following mixing ratios, it was 50%, 76% and 87% in (8:1), (5:1) and (2:1) (PR:S) mixing ratios respectively. This is due to the increase of available soil phosphorus content which is related to the increase of phosphate rock solubility due to decrease of pH derived from oxidation of sulfur by *Thiobacillus* spp.

Key words: Phosphate rock, Elemental sulfur, pH, Phosphate rock solubility, Sulfur oxidation, Agronomic effectiveness, Available phosphorus.

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(Triple superphosphate = TSP)
 .(Single superphosphate = SSP)

(Khasawneh and Doll, 1978; Chien and Friesen, 1992; Chien and Menon,
 .(2002 1995; Rajan *et al.*, 1996; Habib *et al.*, 1999;
 pH
 .(Bolan and Hedley, 1990; Kanobo and Gilkes, 1987; Mackay *et al.*, 1986)

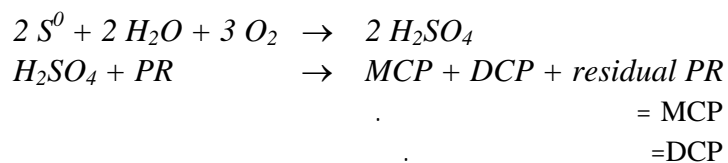
(Edwards, 1956; Hagin and Katz, 1985; .CaCO₃
 .(Singaram *et al.*, 1995; Habib *et al.*, 1999)

(granules)

(Kittams, 1963; Kittams and Attoe, 1965; Swaby, 1975; Pathiratna *et al.*,
 .(1989; Rajan, 1982; 1983, 1989)

Thiobacillus

() 'in situ Superphosphate'
 : .(Rajan *et al.*, 1980)



(1965) Attoe Kittams (1966) Olsen Attoe
 20:1 1:1 (PR:S)

(1970) Swaby .2:1 1:1
 5:1 PR S
 . 653

Sechura (1983) Rajan Queensland Florida
 5:1 (granules)

1987 (pH=5.6)

(pH=5.7) PR:S 5:1
 %55 (Florida)
 (5:1)

()

Hammond *et al.*, North (1986) Carolina
 (2002)

% 4 pH

mesh :
) (Phosphate Rock= PR) -
) ()
) (150) 100
) (Francolite
) %2 %12.2
 Hammond *et al.*,
 9.3342 A° a (1986)
) (Habib *et al.*, 1999) .Ca_{9.64} Na_{0.26} Mg_{0.10} (PO₄)_{5.02} (CO₃)_{0.98} F_{2.39}
 (triple superphosphate = TSP) -
 P₂O₅ 46%
) (S)
) %90 40
) (20-5) :
) pH %3.9
) (1)
 (1)

7.24	(1:2.5) PH _{H2O}
	%
55	
6	
39	
3.6	%
3.9	%CaCO ₃
	mg/kg soil
1.2	H ₂ O-P
3	Olsen-P
	100/
17.5	Ca
7.5	Mg

(1994) Rajan Ghani : (Inoculum)
 / 100
 .(1:10 :)
 .Whatman n° 1
 :
 Rye grass

800 400 PR
 :
 /PR 4800 1600
 S
 PR .(2:1) (5:1) (8:1) (PR:S)
 PR
 .(/P 585.6 195.2 97.6 48.8)

1 :
 2
 2 -1.5 .KNO₃ NH₄NO₃ (K N) / 500
 :
 15
 10

3
 100
)
 (H₃BO₃) B 0.03 mM Zn²⁺ Cu²⁺ Mn²⁺ 5
 0.04 mM
 1 (Na₂MoO₄.2H₂O) Mo 0.005 mM

pH (0.15mM)
 83 54 1
 ° 60
 .(1:2.5)
 Olsen Watanabe and Olsen (1965)
 . pH= 8.5 NaHCO₃ (0.5M)
 :(RAE%)
 . TSP (PR+S)

:(Chien *et al*,1990; Leon *et al.*, 1986; Habib *et al.*, 1999)

$$Y_i = Y_o + b_i \ln(X), \quad X > 1$$

$$= Y_o \quad / \quad = Y_i$$

ppm 1 ()
 = b_i ppm = X
 RAE%

: TSP
 (%)**RAE** = (b_i/ b_{TSP}) x 100

$$= b_{TSP} (b_{PR+S}) \quad = b_i \quad (PR)$$

.TSP

:(RAE%)

.(1)

(PR:S, 8:1, 5:1) (PR:S /P 586 195)

PR

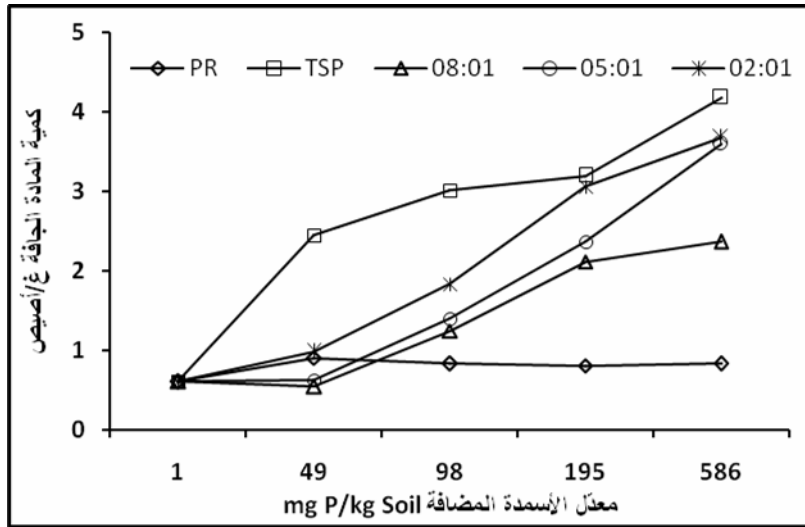
(2:1)

/P 98

8:1 5:1

2:1

.8:1



(1)

.LSD= 0.835

TSP

TSP

(PR:S, 2:1, 5:1)

(1983) Rajan

(PR:S=5:1)

(1989)

Pathiratna

) Rajan

pH TSP
pH

(Ryegrass

(b)

(2) TSP

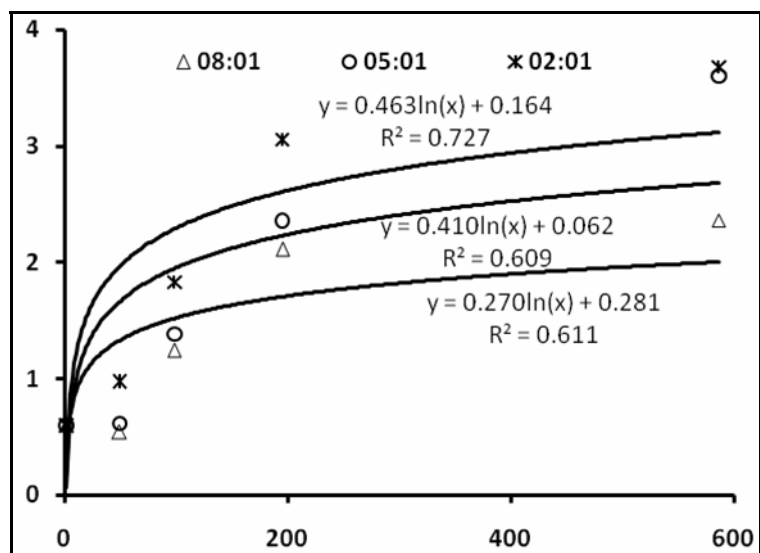
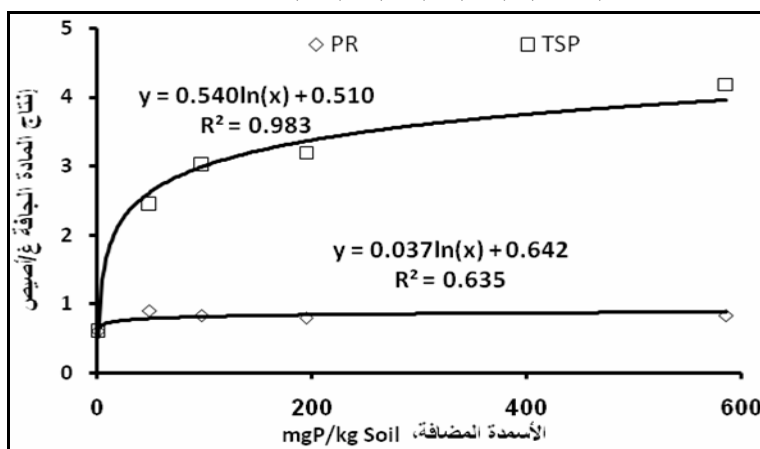
PR

RAE (3) %7 = RAE

%76 %50

(2:1) (5:1) (8:1) (PR:S)

%86



(2)

(RAE %)

(3)

	TSP	PR	PR+S		
			8:1	5:1	2:1
b	0.54	0.037	0.270	0.410	0.463
RAE%	100	7%	50%	76%	86%

:Olsen-P

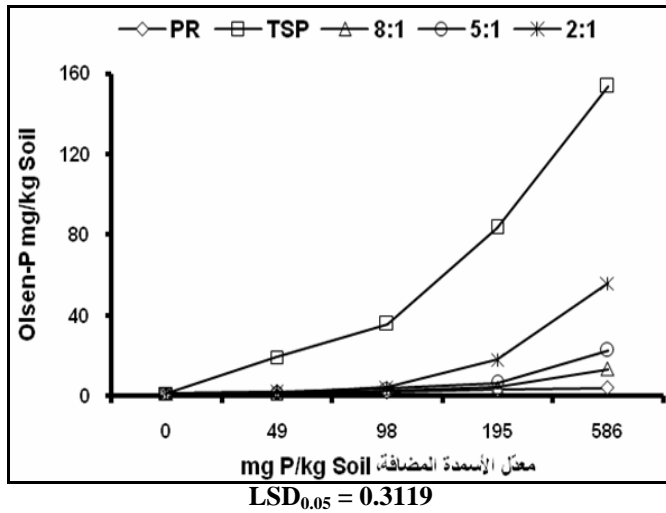
23 14

(2:1) (5:1) (8:1) (PR:S)

/P 156

/P 5

.(3)



(3)

pH

.(4) $R^2=0.6$

%55 CaCO₃ %4

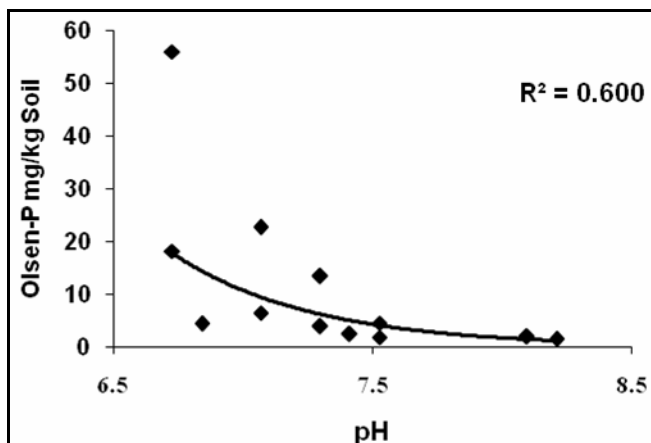
pH

pH

pH

pH

(2009)

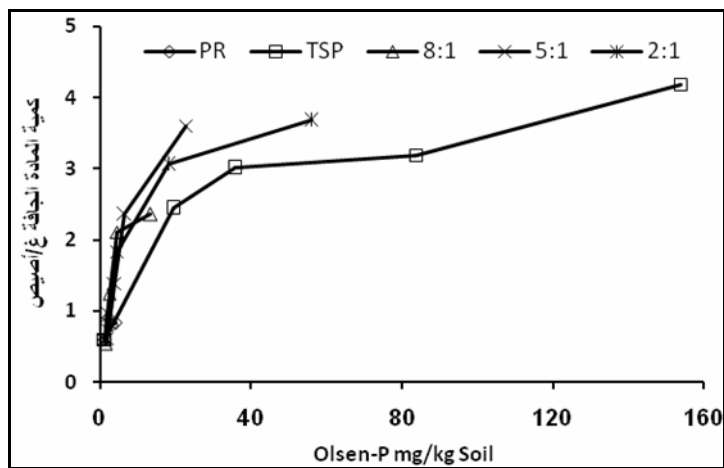


Olsen-P pH (4)

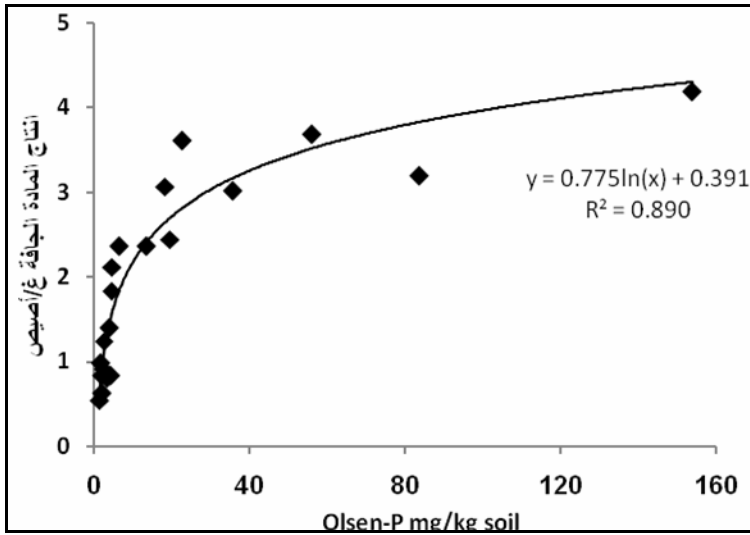
(5)

Olsen-P

(6) R²=0.89



Olsen-P (5)



Olsen-P (6)

pH

Rye grass

%4

TSP

%76 (2:1) %86

(8:1) %50 (5:1)

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 .149-143 (24)
 .2009 .

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