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) (%) ()

Kuo

(1989) Jiang and Gu

(1996)

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%

Fe-P

Al-P

Fe-P

Fe-P < Ca₂-P < Ca₈-P < Al-P < Ca₁₀-P

NH₄Cl-P < Al-P < Fe-P < Ca₁₀-P

(Haldar and Mandal, 1979)

(De Datta et

al. 1966; Patrick and Mahapatra, 1968; Sah and

(Akhgar and Towfighi, 1999)

Mikkelsen, 1986; Shahandeh et al. 1994)

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%

(Delgado et al. 2000)

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(Saleque et

.al. 2004)

%

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%

(Zhang and Mackenzie, 1997)

(Ryan et al. 1985; Samadi and Gilkes, 1999; Indiat, 2000; Lee et al. 2004)

(Mclean, 1982)

pH

(Richards, 1969)

(Olsen and Sommers, 1982)

(Nelson and Sommers, 1982)

(Gee and Bauder, 1986)

(1989) Jiang and Gu

)

(1996) Kuo

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%

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Murphy and)

MSTATC

(Riley, 1962; Kuo, 1996

Excel

() Jiang and Gu

	(mL)
()	(g)
(Ca ₂ -P)	: pH=7.5 0.25M NaHCO ₃
(Ca ₈ -P)	: pH=4.2 0.5M NH ₄ AC
(Al-P)	: pH=8.2 0.5M NH ₄ F
(Fe-P) +	: 0.1N NaOH + 0.1N Na ₂ CO ₃
(Ca ₁₀ -P)	: 0.25M H ₂ SO ₄

() Kuo

	(mL)
()	(g)
/	: 1M NH ₄ Cl
(Al-P)	: pH=8.2 0.5M NH ₄ F
(Fe-P)	: 0.1N NaOH
(Ca ₁₀ -P)	: 0.25M H ₂ SO ₄

()

	(g/kg)	(mg/kg)	pH
	/	/	/
	/	/	/
	/	/	/
	/	/	/

(Olsen-P)

(Patrick and Reddy, 1978)

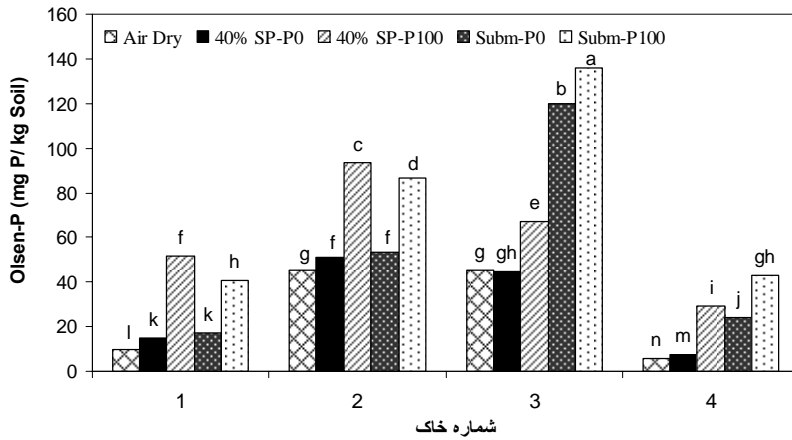
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/ /

(De Datta, 1981)

(1979) Holford and Patrik

()



[() 40% SP-P₀ () Air Dry] () Subm-P₁₀₀ () Subm-P₀ () 40% SP-P₁₀₀ (

(Havlin et al. 1999)

Chauhan et al.

Barrow and Shaw, 1976;)

(1981)

Haynes and Swift, 1979; Sparling et al. 1985; Thien and Myers, 1992; Vanderdeelen, 1995; Turner and (Haygarth, 2003

Olsen and Court .

(1983)

Sadler and .

(1974) Stewart

Holford and Patrik (1974) Patrick and Khalid .
(1979)

(Fe-P) ()

() (2003) Zhang et al. .

Fe-

P

(1968) Patrick and Mahapatra

(1986) Sah and Mikkelsen (1975) Gupta and Singh

Fe-P

Fe-P)

(1975) Gupta and Singh (1964) Mandal

Fe-P

Al-P

Fe-P

Al-P

Oustan .

()

(2006)

Fe-P

(1972) Ponnampereuma

(1999) Havlin et al.

Fe-P

Fe-P

Fe-P

(1992) Torrent et al. .

Fe-P

Fe-P

Fe²⁺

Fe³⁺

Fe²⁺

Fe³⁺

()

Fe-P

(2006) Oustan .

Fe-P

Fe-P

()

(/)

Fe-P

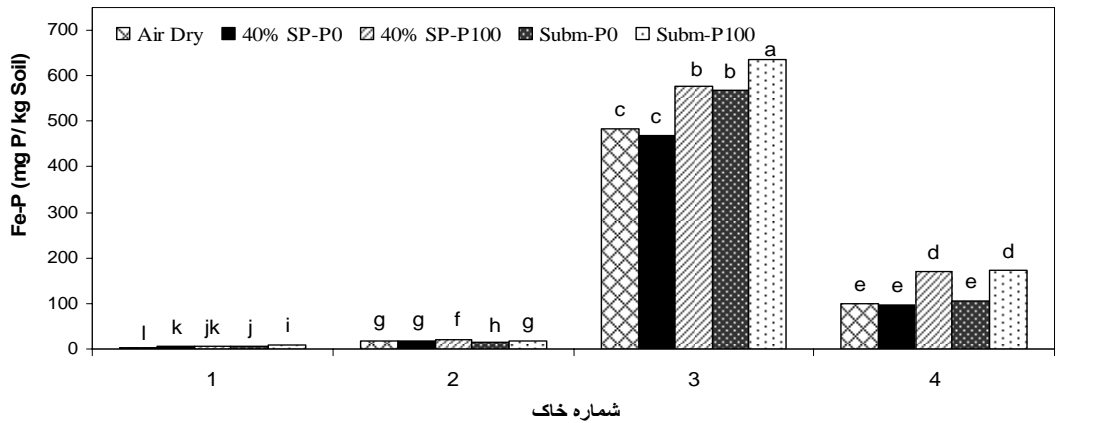
Fe-P

Fe-P

pH

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Fe-P



() 40% SP-P₀ () Air Dry] Fe-P
 .i() Subm-P₁₀₀ () Subm-P₀ () 40% SP-P₁₀₀

(1964) Mandal

Fe-P

Al-P

Fe-P

Al-P

Fe-P

Al

Al

Al-P

Fe-P

Al-P

Al

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Al

(Al-P)

Al-P

pH (Lindsay, 1979)

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(/)

Al-P

) pH

Al

(/

Dikshit and

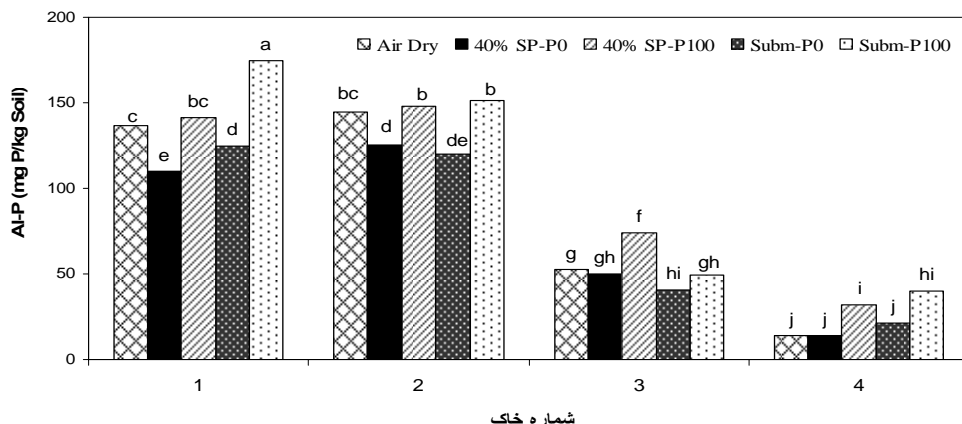
(1968) Patrick and Mahapatra

Al (Lindsay, 1979)

(1988) Padihar

Al-P

Al-P



شماره خاک

40% SP-P₀ () Air Dry] () () Al-P
 [() Subm-P₁₀₀ () Subm-P₀ () 40% SP-P₁₀₀ ()

Al-P

MCP

()

Al-P

pH

pH

(Najafi and

.Towfighi, 2008)

Al⁺³

pH

(Havlin et

Al(OH)₃

Al-

Al-P

.al. 1999)

P

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Al-P

(Ca₂-P)

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Al-P

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Ca₂-P

Al-P

Ca₂-P

Al-P

Al-P

Al-P

)

Ca₂-P

Al-P

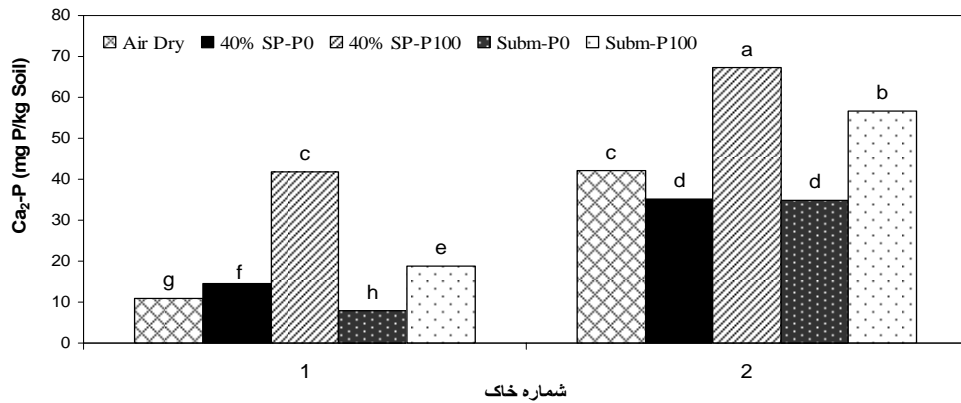
(

Al-P

Al-P

()

Ca₂-P



شماره خاک

() 40% SP-P₀ () Air Dry] () Subm-P₁₀₀ () Subm-P₀ () 40% SP-P₁₀₀ (

(1982) Fixen and Ludwick

Ca₂-P

Ca₈-P

Fixen et .

Ca₂-P

Ca₈-

(1983)al.

P

Ca₂-P

(1986) O'Conner et al. .

Ca₈-P

DCPD DCP

() (Havlin et al. 1999)

Ca₂-P

MCP

Ca₈-P (MCP)

pH

Ca₈-P

MCP

(Najafi and Towfighi, 2008)

(Ca₈-P)

()

Ca₈-P

Ca₈-P

Ca₈-

P

Ca₈-P (1960) Moreno et al.

Ca₈-P

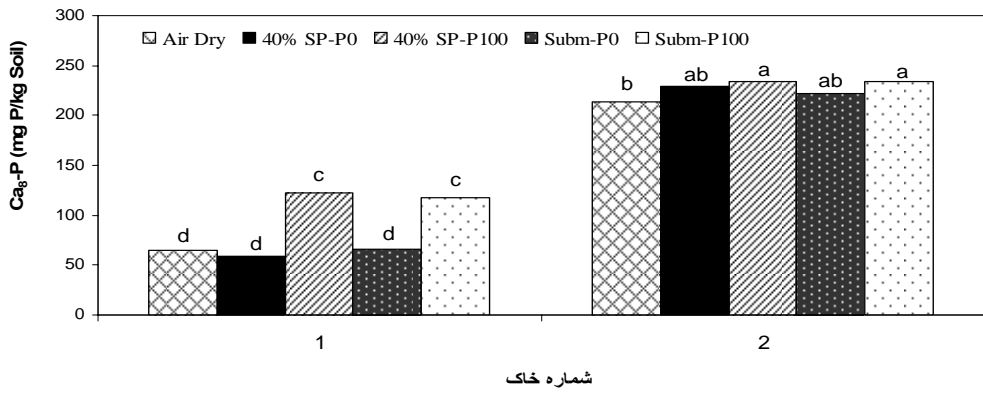
pH

Ca₈-P

Ca₈-P

Ca₈-P

Ca₈-P



شماره خاک
 () 40% SP-P₀ () Air Dry
 () Subm-P₁₀₀ () Subm-P₀ () 40% SP-P₁₀₀

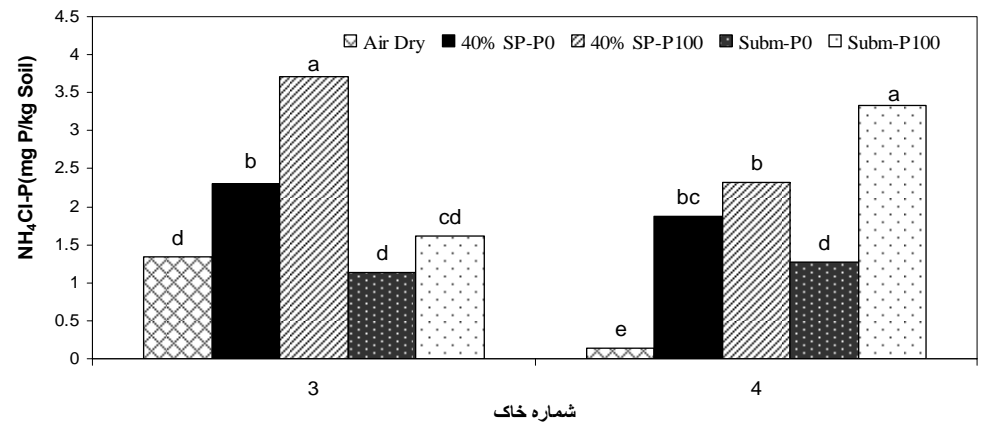
(NH₄Cl-P)

NH₄Cl-P

Gupta and

(1975) Singh

NH₄Cl-P



شماره خاک
 () 40% SP-P₀ () Air Dry
 () Subm-P₁₀₀ () Subm-P₀ () 40% SP-P₁₀₀

NH₄Cl-P

NH₄Cl-P

NH₄Cl-P

NH₄Cl-P

()

NH₄Cl-P

Havlin et al.)

:(1999

Ca²⁺

Ca²⁺

:(Ca₁₀-P)

Ca₁₀-P

Ca₁₀-P

Ca₁₀-P

(1975) Gupta and Singh (1964) Mandal

Ca₁₀-P

Ca₁₀-P

Dikshit and (1975) Gupta and Singh (1964) Mandal

pH

(1988) Padihar

Ca₁₀-P

Najafi and Towfighi,)

()

pH (2008

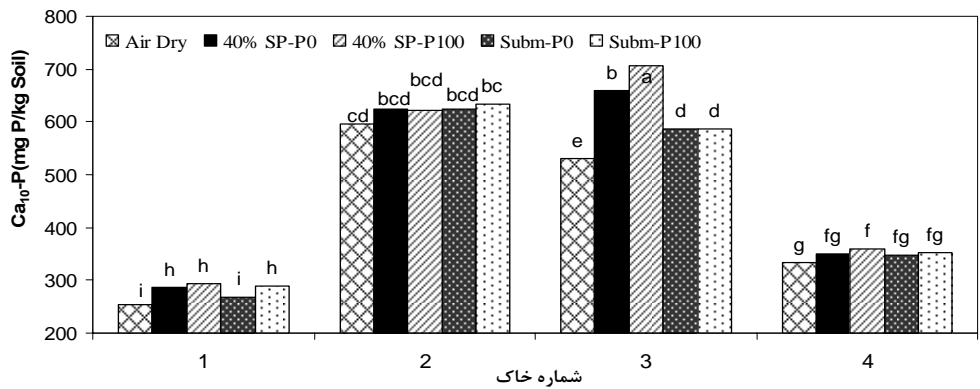
Ca₁₀-P

(2004) Zhang et al.

(1986) Sah and Mikkelsen .

()

Ca₁₀-P MCP



شماره خاک
 1) 40% SP-P₀ () Air Dry] 2) Subm-P₁₀₀ () Subm-P₀ () 3) 40% SP-P₁₀₀ () 4) Ca₁₀-P

Ca₁₀-P

Ca₁₀-P

Ca₁₀-P

Solis and ()

Ca₁₀-P

(1989) Torrent

Ca₁₀-P

Ca₁₀-P

()

Harrison and Adams .

(1987)

pH

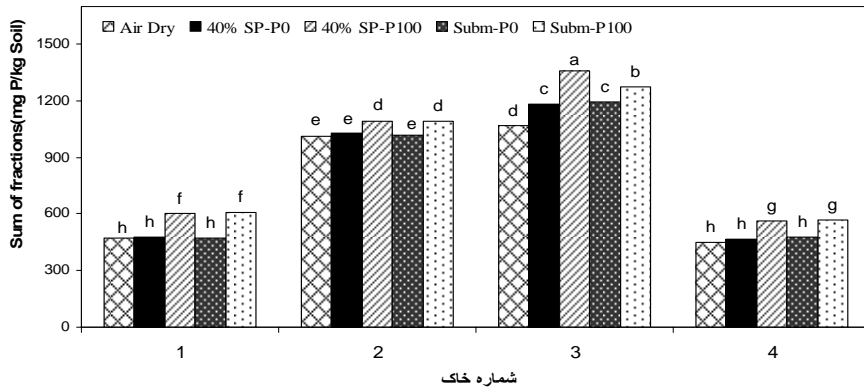
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] 40% SP-P₀ () Air Dry]

.[() Subm-P₁₀₀ (

) Subm-P₀ (

) 40% SP-P₁₀₀ (

P < Ca₂-P < Ca₈-P < Al-P < Ca₁₀-P

NH₄Cl-P < Al-P < Fe-P < Ca₁₀-P

Fe-P

Fe-

NH₄Cl-P < Al-P < Fe-P < Ca₁₀-P

Al-P

Fe-P

Fe-P < Ca₂-P < Ca₈-P < Al-P < Ca₁₀-P

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