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Kuo

(1989) Jiang and Gu

(1996)

(%)

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

Mikkelsen, 1986; Shahandeh et al. 1994)

(Akhgar and Towfighi, 1999)

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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)

Archive of SID

(Mclean, 1982)

pH

(Richards, 1969)

(Olsen and Sommers, 1982)

(Nelson and Sommers, 1982)

(Gee and Bauder, 1986)

(1989) Jiang and Gu

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(1996) Kuo

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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)

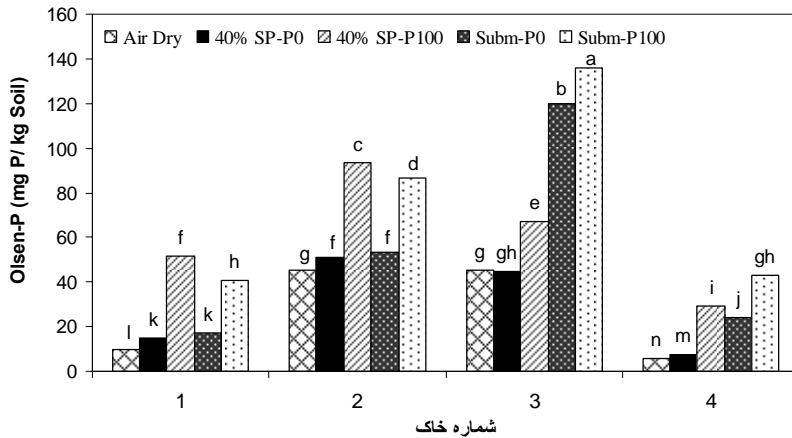
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/ /

(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⁺

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Fe-P

(2006) Oustan .

Fe-P

Fe-P

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(/)

Fe-P

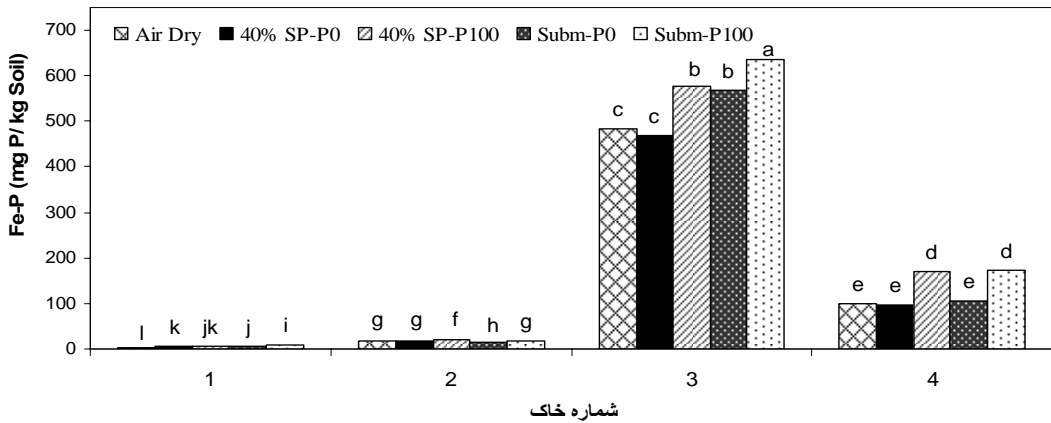
Fe-P

Fe-P

pH

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Fe-P



(

) 40% SP-P₀ (

) Air Dry]

Fe-P

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) Subm-P₁₀₀ (

) Subm-P₀ (

) 40% SP-P₁₀₀

(1964) Mandal

Fe-P

Al-P

Fe-P

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Al-P

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Al-P

Al

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(Al-P)

Al

Al-P

pH

(Lindsay, 1979)

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Al-P

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pH

Al

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Dikshit and

(1968) Patrick and Mahapatra

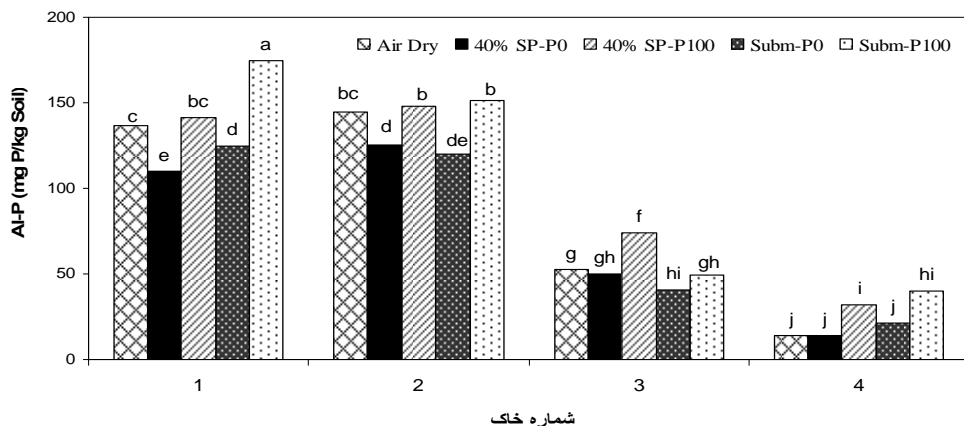
Al

(Lindsay, 1979)

(1988) Padihar

Al-P

Al-P



شماره خاک

40% SP-P₀ () Air Dry] () () () Air-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. 1999)

Al-

Al-P

P

()

Al-P

(Ca₂-P)

Al-P

Ca₂-P

Al-P

Ca₂-P

Al-P

Al-P

Al-P

)

Ca₂-P

Al-P

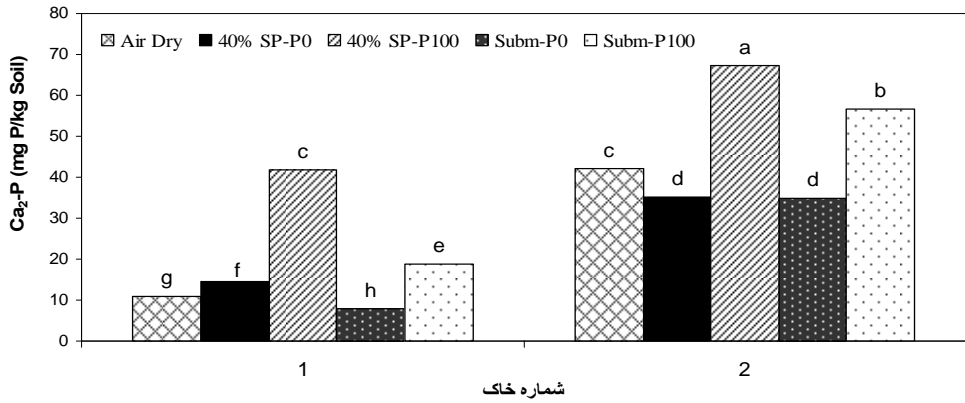
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Al-P

Al-P

()

Ca₂-P



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

(1982) Fixen and Ludwick

Ca₈-P

Fixen et al.

Ca₈-

(1983)al.

P

(1986) O'Conner et al.

Ca₈-P

DCPD DCP

() (Havlin et al. 1999)

MCP

Ca₈-P (MCP)

Ca₂-P

Ca₈-P

Ca₈-P

pH

MCP

(Najafi and Towfighi, 2008)

(Ca₈-P)

()

Ca₈-

Ca₈-P

Ca₈-P

P

Ca₈-P (1960) Moreno et al.

Ca₈-P

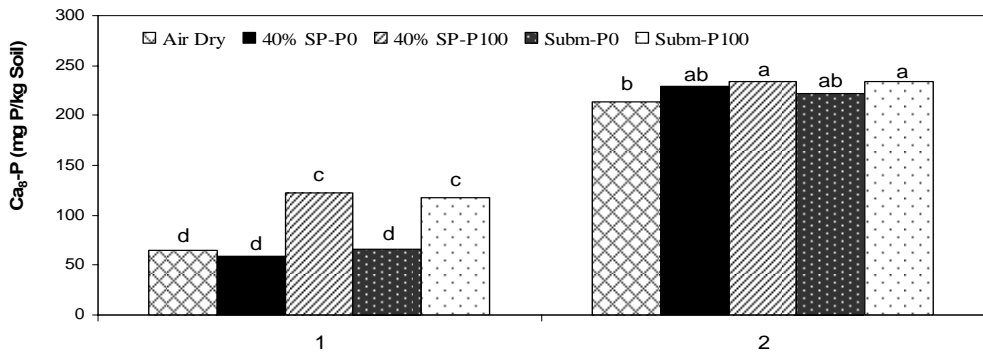
pH

Ca₈-P

Ca₈-P

Ca₈-P

Ca₈-P



شماره خاک

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

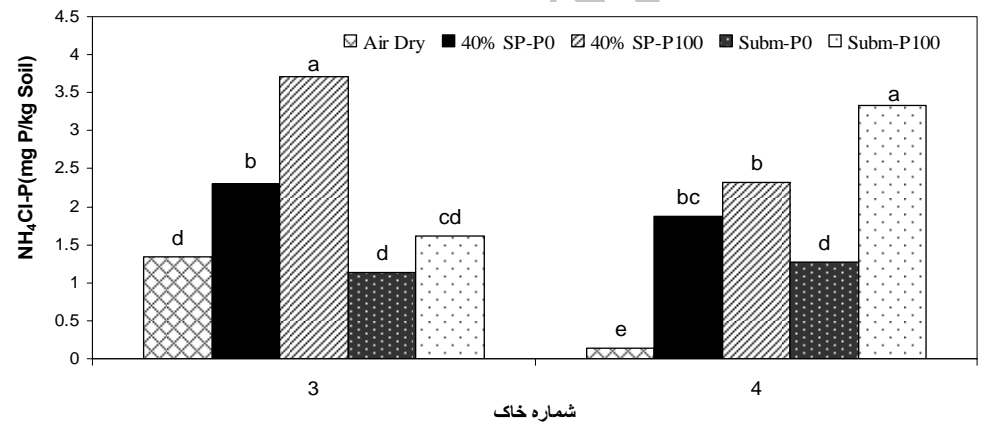
(NH₄Cl-P)

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)

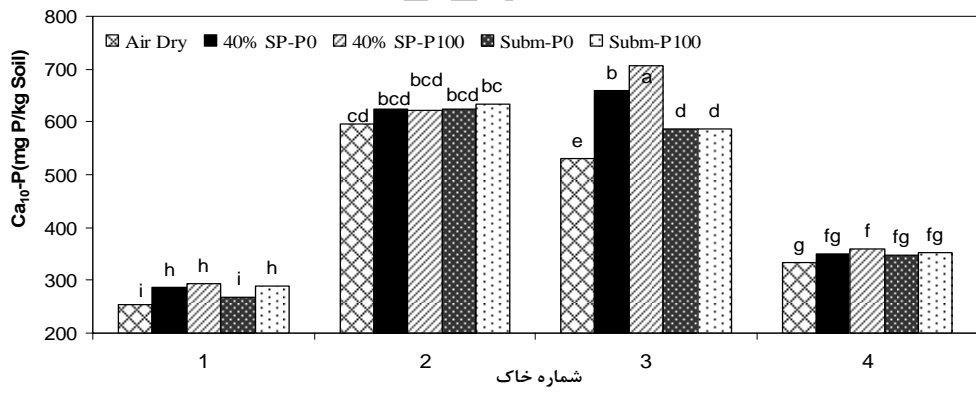
Ca₁₀-P

(2004) Zhang et al.

(1986) Sah and Mikkelsen .

()

Ca₁₀-P MCP



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

Ca₁₀-P

Ca₁₀-P

Ca₁₀-P

Solis and ()

Ca₁₀-P

(1989) Torrent

Ca₁₀-P

Ca₁₀-P

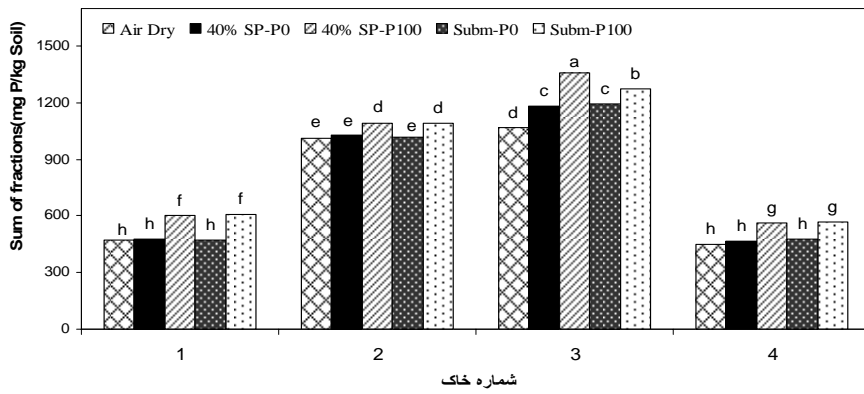
Harrison and Adams .

(1987)

pH

pH

pH



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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