

(1) (1)

(1)

CPSMV

CPSMV

- -

/ 24.93

/ 59.86

/ 2.13

/ 0.62

(p=0.05)

%2.550

%2.502

%1.29

%1.788

%1.29

70.6 12.8

32.4 114 26.6

8.7

10.4 34.6 16.4

:

(1)

Effect of *Rhizobia* and Cowpea Severe Mosaic Virus (CPSMV) Interaction on Bacterial Nodulation and Nitrogen Fixation in Cowpea

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ABSTRACT

This study was conducted to evaluate the effect of seed *Rhizobia*-treating and Cowpea severe mosaic virus (CPSMV) inoculation on bacterial nodulation and nitrogen fixation in cowpea. CPSMV was isolated from infected plants, College of Agriculture, Abu-Ghraib, Baghdad, IRAQ, the *Rhizobia* was isolated from nodules on roots of cowpea plants. The plants were inoculated by the virus 2 weeks after germinations. Nodules on roots of *Rhizobia*-treated plants were formed while no nodules were observed on non-treated ones. The mean number of nodules was 24.93\ plant on virus inoculated plants compared to 59.86 nodules\plant on non-inoculated ones. Significant reduction in nodules weight was induced by the virus, 0.62 gm on the virus inoculated plants compared to 2.13gm on non-inoculated ones. It has been found that the *Rhizobia* induced significant increase in nitrogen percentage at p=0.05 in the foliage, 1.29% in plants non-treated with *Rhizobia* non-inoculated by the virus compared with 2.502% in *Rhizobia* treated-virus inoculated plants and 2.550% in *Rhizobia* treated non inoculated plants. The virus caused an increase in nitrogen percentage, 1.877% compared to 1.29% in non-inoculated plants. The *Rhizobia* caused an increase in pods number\plant, seed number\plant, and seed dry weight (gm)\plant, 25.6, 114, 32.4 compared to 12.8, 70.6, 8.7 in non-treated plants respectively. The treatment of virus inoculated plant by *Rhizobia* induced a significant increase in these values, except with nitrogen percentage in seeds, 16.4, 84.6, 10.4, 4.3 respectively.

Key Words: *Rhizobia*, Cowpea, Mosaic Virus, Nodulation.

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.(Chen *et al.*, 2002)

(PGPR) Plant growth promoting rhizobacteria

.(Kloepper *et al.*, 1993; Arras and Arru, 1997; Peix *et al.*, 2001)

.()

.(Tu *et al.*, 1970^b)

) Leghemoglobin

(

(1986)

(PSV) Peanut stunting virus

% 78.4

%78.6

Leghemoglobin

.(Orellana *et al.*, 1978 & 1980)

(FBNYV) Faba bean necrotic yellow nanovirus

.(Katul *et al.*, 1993)

.(Orellana *et al.*, 1978)

(1984)

Khadhair

)

(1987

.(Fegla *et al.*, 1981)

:

/

:

(%1)

:

NaCl 0.2 KH₂PO₄ 1 K₂HPO₄ 1) -
 KNO₃ 1 FeCl₂.2H₂O 0.08 CaSO₄.2H₂O 0.1 MgSO₄.7H₂O 0.2
 (1 / 15 10 1
 (Osa-Afiana and Alexander, 1979)

250

(4 °28 -)

1 8-10 - 1-10

(Plate count)

20

4 ° 28

.(³ / 10⁷ × 2.193)

% 95

/ 4

(2009)

:

%1 %1 K₂HPO₄ %0.5

(300 : 500)

°121 2 / 1.5

(%1)

4 (mix soil)

.1

.2

5

1

MgSO₄.7H₂O 5.5 CaSO₄.2H₂O 13.7 Ca₃(PO₄)₂ 18 KCl 31.7

H₃Bo₃ 0.5 MnSO₄.H₂O 0.6 CuSO₄.5H₂O 0.5 Fe₂(SO₄)₃ 2.7

(Burton *et al.*, 1972)

(K₂HPO₄ 26.8

:

4 : 1

0.01

/

:

/

/

:

...

250 0.2
 3 8 1
 °100 (H₂O₂)
 °30
 Auto 100 250
 (Gersar, 1981) analyzer

(1)
 / 24.93 54.86

(1)
)
 (1984) (2009
 (Mung bean)

CPSMV (1)

/				()
15	0	27.6	0	60
23.8	0	56.4	0	85
36	0	80.6	0	100
24.93	0	54.86	0	

5.921 = 0.05

7.9012 = 0.01

Soybean mosaic virus
 (BPMV) Bean pod mosaic virus (SMV)
 Tomato ring spot virus (TRSV)

(Orellana *et al.*,1978 & 1980; Tu *et al.*,1970^{a,b})

Bean yellow mosaic virus

.(Orellana and Fan, 1978)

(BYMV)

.(Fegla *etal.*, 1981; Graham, 1985)



(1) (1)
(4) (2) (3)

2.13

0.62

.(2)

()

()

...

CPSMV

(2)

(/)				()
0.26	0	1.04	0	60
0.6	0	2.28	0	85
1	0	3.08	0	100
*0.62	0	2.13	0	

0.2682 = 0.05

0.3579 = 0.01

Leghemoglobin
Nitrogenase

^a(1970) Tu
(C:N) /

C:N

Nitrogenase

(3)

2.502

1.29

1.29

1.788

0.05

CPSMV (3)

%				()
1.93	1.422	2.202	0.76	60
2.53	1.822	2.396	1.332	85
3.216	2.12	2.91	1.78	100
*2.550	1.788	*2.502	1.29	

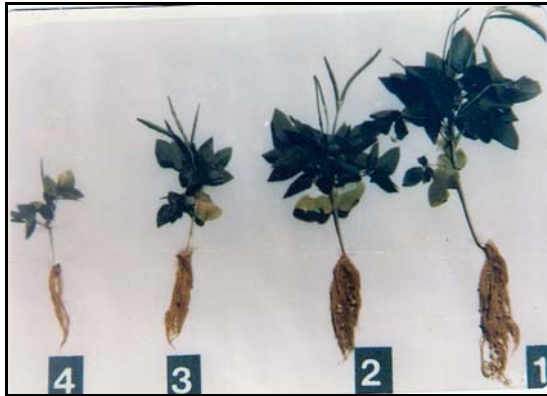
0.388 = 0.05

0.517 = 0.01

.(2.55 2.502)

Rajago palan and)

.(Raju, 1972; Singh *et al.*, 1979; Tu *et al.*, 1970^a)



(4) (2) (3) (1) (2)

...

(4)

/ /

70.6 12.8 1.7 32.4 114 25.6 . 3.8 18.7

.2 2.7 7.9 30.0 5.8

0.01

4.3 10.4 84.6 16.4

CPSMV

(4)

	(/)	/	/	
3.8	18.7	70.6	12.8	()
4.7	32.4	144	25.2	
2.7	7.9	30.0	5.8	
4.3	20.4	84.6	16.4	
1.057	4.863	17.973	7.119	0.01
0.767	3.529	13.044	5.166	0.05

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