

( *Solanum tuberosum* L.)

\*\*

\*

2000	1999		/	
40 - 25)		( /	38132	58664)
( /	1.0	0.5	0.0)	( 55 55 -40
( /	58664)		.Desiree -	
2000	1999	(59.22%	53.99%)	
/	1.0			( / 38132)
(22.9%	21.9%)			(66.3% 61.8%)
	(15.2%	12.8%)		(31.0 33.05%)
(34.1%	38.6%)			(12.3% 12.9%)
		27.6%	30.5%	( 55 )
				(31.4% 33.0%)
/	1.0	/	58664	
				( 55 )

1

(1989 ) .

( *Solanum tuberosum* L.)  
(*Solanaceae*)

/	15.9				*	
/	19.4	(1998	)	(	) .	**
(Jackson and Karr, 1991)				.2010/1/25	2007/4/15	
Tasmania	/	43.50				

(1991 Laurance) 1990-1989  
 13 -4  
 DTPB) . (0.91 -0.85)  
 .(2007

.(1988 )

.(1987 )  
 (1993)

( 30 20 ) (10) (1994

Mohammad .  
 20 15) (1993)

(25 .(1996 Bang 1995 Ahmed)  
 / 10.17) (25)  
 ( / 442.2) (

(15) %50

13.272 )  
 (1995) Vokal Cepl Oliveira) (1994

(40 29 21 15) .(1982  
 Koruna Table Krasa Rainey .  
 (1999)

(21 15) 20

(1996) Radil Vokal

0.96 1.171

(0.1% + 0.5%) (1993) (90 75)

(10) (1998) Maher .

(1998) Ugland Guttormsen .

(1995)

/ (2 1 0.5 0.0) Aksel

1.0

/ - 20)

/ 2.0 Aksel . (30

(30)

Gebremedhin Gebre

Ahmed (2001)

(0.375) (1995) (Tolcha Menagesha

(5.33) / (30 25)

(FYM) Farm yard manure

28.6 % / 62.6 2 /

Aromin . 25 Menagesha

(1996) (2008) Olojede

Clone Ho-85 Granola tall Granola short 80.000 60.000 20.000·40.000)

80% 48% 42% / (

( 16 40) 60.000)

60 40 / ( 80.000

Janagrad . / 200 15:15:15

(1996) Bang . (2009)

(37) 75 )

8 15 20% 150 75

10 150 35

( 45

(1998) Hussain . / 5.3

- 60) Aksel 7% 14%  
 (100 80) (2000)

Rykbost Aksel ( 1250 625) 17%  
 (80)  
 (1998)

Russet Burbank  
 Russet Nokotah Century Russet (2004) Griffeth Sexton  
 1997 1996 1995 / (2.00 1.26 0.91 0.50) 25

(2001) Khalafalla )  
 ( / (1.26 0.91 0.72)  
 (35 25 15)

/ 1.26 0.91

/ ) (Control)

( / )

Subhan (1990)  
 ( / 38132 58664)  
 55 55 -40 40 -25) Granda (NPK)  
 0.5 0.0) (

( / 1.0) (1992) Subhan

Desiree Desiree

30)

(40

/ /

2000 1999 (1998) Ugland Guttormsen

Di- (30) Page  
 150) ammonium phosphate (1982 (1)  
 ( / .(1)  
 / (1.0 0.5 0.0) (2)  
 7 /  
 9  
 ( Tween-80) ( /<sup>3</sup> 80)  
 ) 75 -  
 .(1996 ) ( (30 20) 15  
 2 30 Dithane  
 58664 / 13 20) 2000 1999 (15) M45  
 0.0) ( / 38132 .(1999 ) /  
 ( 55 / (1.0 0.5 Desiree  
 55-40 40-25)  
 20 17  
 RCBD  
 4  
 75 55 55 - 40 40 - 25)  
 .<sup>2</sup> 9 .(

( 1 ) :

30 .

2000	1999		
3.4	5.9		Sand
55	54		Silt
41.6	40.1		Clay
0.200	0.108		
8.7	8.9		
0.197	0.195	/	
1.22	1.13		
1.18	1.18		O.M
7.62	7.66		pH
0.306	0.322	/	E.C

$$\% ) 0.891 + 17.55 = \%$$

$$.(14.18 -$$

.(2000 ) 5%

A. O. A. C) 6.25 Kjeldal method

- (1970

( 20)

- ,dichlorophenol

.(1987 ) 2 -6 indophenol ( 20)

Carmine method

(1965 Black) spectrophotometer :

:(2)

	.2000	1999			
/	%	(°)	(°)	(°)	
		1999			
-	37.95	14.77	7.20	22.35	
2.7	44.45	11.47	4.90	18.05	
41.0	62.73	11.84	6.91	16.77	
31.8	61.45	13.61	9.35	18.87	
-	42.50	18.60	10.45	26.75	
-	38.80	21.32	13.20	29.45	
-	37.10	21.82	12.90	30.75	
-	32.15	24.15	14.20	34.10	
-	25.68	27.16	19.50	34.82	
-	22.95	27.95	18.40	37.50	
-	27.35	30.30	21.90	38.60	
-	31.55	29.35	20.85	37.85	
		2000			
6.5	52.15	7.92	2.10	13.75	
8.2	53.00	9.93	2.72	16.15	
69.5	63.27	11.95	5.18	18.72	
10.0	48.25	17.52	9.35	25.70	
1.8	49.10	18.70	13.65	23.75	
27.2	53.70	17.62	11.00	24.25	
0.5	55.65	20.35	12.60	28.10	
0.5	43.15	20.50	12.70	28.30	
-	36.09	25.61	16.27	34.95	
-	30.75	27.70	18.20	37.20	
-	23.45	31.27	23.10	39.45	
-	21.30	27.00	17.00	37.00	

(1995)	(2000)	(3)	/	58664
		38132		
		%59.22	%53.99	/
)		Vokal	Cepl	(1993)
	.(1984			(1995)
	(1988)			
		0.5		/ 1.0
		Ahmed	(1993)	
.(1963 Suri)		.(1996)	Bang	(1995)
	.( 55 - 40)		.(5 4 )	
	(8 7 6)			(1990) Subhan
			.(4 )	
Mondy and Munshi	(1993)	(1995)	/	1.0
			.( 55 )	
			(5 4)	
	(9)			



) / (1989 ) Starch phosphorylase  
 ( 55 Nitrate- reductase  
 .( / 1.0) (1980 Bonilla)  
 -  
 Desiree (1964) Somogoyi Trautner  
 ( / 58664) -  
 ( 55 )  
 / 1.0  
 .  
 .(1989 ) -  
 (10)  
 (2000)  
 38132  
 / 1.0 /  
 40-25  
 / 1.0 . 14.153  
 . Desiree  
 58664 /

( / )		: ( 3 )		
( / )		( / )	( )	( / )
2000	1999	( / )	( )	( / )
11.148 e-h	11.392 gh	0.0		
13.104 d-g	12.440 fg	0.5		
14.080 de	16.524 de	1.0	40-25	
12.908 d-g	15.596 de	0.0		
15.644 cd	17.748 cd	0.5		
20.240 ab	19.768 bc	1.0	55-40	58664
17.816 bc	19.264 bc	0.0		
22.488 a	21.412 ab	0.5		
21.220 a	22.488 a	1.0	55	
6.608 j	7.404 j	0.0		
8.516 h-j	8.136 ij	0.5		
7.436 ij	9.976 hi	1.0	40-25	
9.532 hi	8.896 ij	0.0		
10.932 f-h	12.540 fg	0.5		
10.104 g-l	11.296 gh	1.0	55-40	38132
11.088 e-h	12.012 f-h	0.0		
13.472 d-f	14.204 ef	0.5		
15.160 ed	17.288 ab	1.0	55	
		1999		
/	38132	/	58644	
11.306 b		17.404 a		
/	1.0	/	0.5	/
17.776 a	14.308 b	10.984 c		
55	55-40	40-25		
16.224 a	14.420 b	12.428 c		
		2000		
/	38132	/	58644	
10.316 b		16.165 a		
/	1.0	/	0.5	/
16.860 a	13.212 b	10.148 c		
55	55-40	40-25		
14.692 a	14.024 ab	11.516 c		

.%5

\*

/		: ( 4 )		
/				
2000	1999	( / )	( )	( / )
4.600 ef	4.833 b	0.0		
5.217 f-c	5.533 b	0.5		
5.950 b-e	6.867 ab	1.0	40-25	
4.133 f	5.367 ab	0.0		
5.283 c-f	6.667 ab	0.5		
7.700 a	7.200 ab	1.0	55-40	58664
5.583 b-f	6.067 b	0.0		
6.600 a-c	7.367 ab	0.5		
6.033 a-c	6.867 ab	1.0	55	
4.383 ef	5.300 b	0.0		
5.383 c-f	5.933 b	0.5		
5.083 c-f	7.033 ab	1.0	40-25	
4.750 d-f	4.867 b	0.0		
6.400 a-d	6.167 b	0.5		
6.400 a-d	5.633 b	1.0	55-40	38132
5.800 b-f	5.867 b	0.0		
6.350 a-d	7.733 ab	0.5		
7.283 ab	9.367 a	1.0	55	
		1999		
/ 38132		/ 58644		
6.433		6.307		
a		a		
/ 1.0		/ 0.5		/ 0.0
7.211		5.983		5.917
a		b		b
55		55-40		40-25
7.161		6.567		5.383
a		ab		c
		2000		
/ 38132		/ 58644		
5.759		5.678		
a		a		

/ 1.0	/ 0.5	/ 0.0	
6.275	5.778	5.103	
a	a	b	
55	55-40	40-25	
6.408	5.872	4.875	
a	ab	c	
.%5			*

( ) : ( 5 )  
 ( )

2000	1999	( / )	( )	( / )
44.818 c-e	41.774 d-f	0.0		
45.334 c-e	40.002 ef	0.5		
42.660 de	43.989 c-f	1.0	40-25	
55.682 a-d	52.197 a-c	0.0		
52.618 a-e	47.442 b-f	0.5		
47.817 b-e	49.939 a-e	1.0	55-40	58664
56.770 a-c	56.643 ab	0.0		
59.737 ab	52.436 a-c	0.5		
61.951 a	59.620 a	1.0	55	
42.423 de	38.928 f	0.0		
46.544 b-e	40.053 ef	0.5		
40.945 e	39.239 f	1.0	40-25	
53.968 a-e	50.403 a-d	0.0		
46.496 e	51.898 a-d	0.5		
45.191 c-e	56.275 ab	1.0	55-40	38132
51.605 a-e	56.163 ab	0.0		
58.115 a-c	49.627 a-c	0.5		
56.138 c	50.024 c	1.0	55	
		1999		
/ 38132		/ 58644		
48.068		49.338		
a		a		
/ 1.0	/ 0.5	/ 0.0		

54.085 a	51.359 ab	40.664 c
55	55-40	40-25
49.847 a	46.909 a	49.351 a
		2000
/ 38132		/ 58644
49.047 a		51.931 a
/ 1.0	/ 0.5	/ 0.0
57.386 a	50.295 b	43.787 c
55	55-40	40-25
49.117 a	51.474 a	50.877 a
.%5		*

(%) : ( 6 )

(%)

2000	1999	( / )	( )	( / )
14.137 b-d	11.391 ab	0.0		
12.254 d	12.354 ab	0.5		
12.649 cd	12.109 ab	1.0	40-25	
14.419 a-d	11.721 ab	0.0		
13.412 b-d	13.329 ab	0.5		
14.589 a-d	12.036 ab	1.0	55-40	58664
14.915 a-c	11.601 ab	0.0		
15.351 ab	13.059 ab	0.5		
14.949 a-c	12.555 ab	1.0	55	
14.082 b-d	10.918 b	0.0		
13.123 b-d	12.370 ab	0.5		
13.941 b-d	11.696 ab	1.0	40-25	
14.047 b-d	11.463 ab	0.0		38132
15.160 ab	12.502 ab	0.5		
14.404 a-d	13.148 ab	1.0	55-40	

14.272 b-d	13.681 a	0.0	
15.031 a-c	12.284 ab	0.5	55
16.887 a	13.396 a	1.0	

1999

/ 38132	/ 58644		
12.384	12.239		
a	a		
/ 1.0	/ 0.5	/ 0.0	
12.762	12.366	11.806	
a	b	b	
55	55-40	40-25	
12.490	12.649	11.796	
a	a	a	

2000

/ 38132	/ 58644		
14.550	14.075		
a	c		
/ 1.0	/ 0.5	/ 0.0	
15.234	14.339	13.364	
a	a	b	
55	55-40	40-25	
14.570	14.055	14.312	
a	a	a	

.%5

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(%)

: (7)

(%)

2000	1999	( / )	( )	( / )
9.727 a	10.150 a-c	0.0		
9.275 a	8.402 c	0.5		
9.625 a	8.867 bc	1.0	40-25	
12.312 a	14.000 ab	0.0		58664
12.229 a	9.217 bc	0.5		
11.962 a	9.800 a-c	1.0	55-40	
12.625 a	14.817 a	0.0	55	

12.075 a	14.000 ab	0.5		
11.896 a	11.433 a-c	1.0		
9.450 a	10.967 a-c	0.0		
10.967 a	11.550 a-c	0.5		
9.650 a	12.133 a-c	1.0	40-25	
12.075 a	11.550 a-c	0.0		38132
11.871 a	10.967 a-c	0.5		
12.444 a	10.150 a-c	1.0	55-40	
12.417 a	13.650 a-c	0.0		
12.900 a	12.600 a-c	0.5		
11.658 a	10.733 a-c	1.0	55	

1999

	/ 38132		/ 58644	
	11.589		11.187	
	a		a	
	/ 1.0	/ 0.5	/ 0.0	
12.872		10.947	10.345	
a		b	b	
55		55-40	40-25	
10.519		11.122	12.522	
a		a	a	

2000

	/ 38132		/ 58644	
	11.493		11.303	
	a		a	
	/ 1.0	/ 0.5	/ 0.0	
12.262		12.149	9.873	
a		a	b	
55		55-40	40-25	
11.206		11.553	11.435	
a		a	a	

.%5

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3 100 / ) : ( 8 )

( / )		( / )	( )	( / )
2000	1999	( / )	( )	( / )
12.333 d	12.500 f	0.0		
12.000 d	15.833 f	0.5	40-25	
12.333 d	15.000 f	1.0		
13.333 cd	18.333 a-d	0.0		
13.667 b-d	14.167 c-e	0.5	55-40	58664
14.667 a-d	16.667 b-f	1.0		
17.333 ab	17.500 b-e	0.0		
14.333 a-d	19.167 a-c	0.5	55	
16.667 a-c	20.833 ab	1.0		
12.667 d	15.833 c-f	0.0		
12.667 d	14.167 d-f	0.5	40-25	
12.333 d	12.500 f	1.0		
14.000 a-d	15.000 f	0.0		
14.000 a-d	17.500 b-e	0.5	55-40	
15.000 a-d	13.333 ef	1.0		38132
17.667 a	22.333 a	0.0		
17.000 a-c	18.333 a-d	0.5	55	
16.667 a-c	20.833 ab	1.0		
		1999		
	/ 38132		/ 58644	
	16.648		16.667	
	a		a	
/ 1.0	/ 0.5		/ 0.0	
19.833	15.833		14.305	
a	b		b	
55	55-40		40-25	
16.528	16.528		16.917	
a	a		a	
		2000		
	/ 38132		/ 58644	



14.667		14.074
a		a
/ 1.0	/ 0.5	/ 0.0
16.611	14.111	12.389
a	b	c
55	55-40	40-25
14.611	13.944	14.555
a	a	a

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:(9)

( / )		( / )	( )	( / )
2000	1999	( / )	( )	( / )
20.176 b-d	17.268 a-c	0.0		
20.593 a-d	17.639 a-c	0.5		
21.223 a-c	17.503 a-c	1.0	40-25	
18.236 d	18.348 a-c	0.0		
19.536 b-d	19.443 a-c	0.5		
21.712 ab	19.139 a-c	1.0	55-40	58664
18.879 cd	18.074 a-c	0.0		
20.857 a-d	17.991 a-c	0.5		
21.261 a-c	18.570 a-c	1.0	55	
20.288 b-d	16.736 c	0.0		
20.513 b-d	17.348	0.5		
20.502 b-d	19.838 a	1.0	40-25	
19.211 b-d	18.366 a-c	0.0		
21.497 ab	18.515 a-c	0.5		
21.353 a-c	18.270 a-c	1.0	55-40	38132
20.130 b-d	17.610 a-c	0.0		
20.650 a-d	19.240 a-c	0.5		
23.436 a	19.518 ab	1.0	55	
				1999
/ 38132		/ 58644		
18.382		18.220		
a		a		

( / )		( / )	( )	( / )
2000	1999	( / )	( )	( / )
/ 1.0	/ 0.5	/ 0.0		
18.807	18.362	17.734		
a	a	a		
55	55-40	40-25		
18.501	18.680	17.722		
a	a	a		
		2000		
/ 38132		/ 58644		
20.842		20.252		
a		a		
/ 1.0	/ 0.5	/ 0.0		
21.581	20.608	19.453		
a	a	b		
55	55-40	40-25		
20.835	20.257	20.549		
a	a	a		

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( ) : ( 10 )

( )		( / )	( )	( / )
2000	1999	( / )	( )	( / )
10.687 b	10.560 a	0.0		
12.167 ab	9.625 a	0.5		
11.573 ab	10.733 a	1.0	40-25	
12.347 ab	9.697 a	0.0		
13.107 ab	10.765 a	0.5		
13.413 ab	10.928 a	1.0	55-40	58664
13.093 ab	10.012 a	0.0		
13.540 ab	10.384 a	0.5		
13.100 ab	11.080 a	1.0	55	
11.197 ab	10.278 a	0.0		
11.150 ab	10.665 a	0.5		

11.843 ab	10.709 a	1.0	40-25	
13.460 ab	10.701 a	0.0		
13.140 ab	11.194 a	0.5		38132
12.260 ab	9.639 a	1.0	55-40	
14.153 a	10.837 a	0.0		
14.013 ab	10.531 a	0.5		
13.000 ab	10.650 a	1.0	55	

1999

/	38132	/	58644
10.578 a		10.420 a	
/	1.0	/	0.5
10.582 a	10.487 a	10.428 a	
55	55-40	40-25	
10.623 a	10.527 a	10.347 a	

2000

/	38132	/	58644
12.691 a		12.558 a	
/	1.0	/	0.5
13.483 a	12.954 a	11.436 b	
55	55-40	40-25	
12.532 a	12.583 a	12.489 a	

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24

.(1993)

.(1989)

.127 - 122 : (2)

.(2000)

.(1993)

.(1989)

Solanum

tuberosum L.

Solanum tuberosum L.

.133 - 128 .(2) (24)

( ) .(1998)  
 .95 - 77 .(2) (5)  
 .(1988)  
 ( ) -  
 -  
 .(1996)  
 -  
 .Cucurbita pepo L  
 -  
 .(1988)  
 .(1987)  
 -  
 .103 - 89 .(2) (3)  
 .(1989)  
 -  
 .(1999)  
 -  
 .( )

Vicia faba )  
 .25 - 20:(12)  
 .(1984)  
 -  
 .(2000)  
 -  
 -  
 .(1995)  
 Solanum tuberosum L.  
 .127 - 122 :(1) 26  
 .(1987)

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## **Effect of Planting Density, Seed Tuber Size and Boron Application On Potato Yield And Chemical Composition**

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### **ABSTRACT**

This study was conducted at vegetable field of Agric. College/ Dohuk Univ., Iraq, to study the effect of tow planting density (58664 and 38132 plants/ ha) with three tuber sizes (25- 40, 40- 55 & more than 55 mm.) in addition to three levels of boron (0.0, 0.5 & 1.0 Kg Boron/ ha.) on the marketable yield of potato (Desiree cv.). The results revealed that Planting density with 58664 plants/ ha. gave an increase estimated with 53.99% & 59.22% in the marketable yield in 1999 / 2000 & 2000 / 2001 growing seasons respectively as compared with planting density 38132 plants/ha. Foliar application of boron with 1.0 kg / ha caused significant effects on yield quality and quantity by increasing the marketable yield with 61.8% & 66.3%, tuber weight per plant with 60% & 59.4%, number of tubers per plant with 21.869% & 22.967%, average tuber weight with 33% & 31%, An

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increase in starch percentage with 12.8% & 15.2%, protein percentage with 12.9% & 12.3% and in vitamin-C content with 38.6% & 34.1% in tubers by using 1.0 kg Boron/ha in both growing season 1999/ 2000 and 2000/ 2001. Increasing the size of seed tubers gave higher marketable yield estimated with 30.5% & 27.6%, 33.8% & 27.1% in tuber weight per plant and 33.03% & 31.4% in the number of tubers per plant in both growing season 1999/ 2000 & 2000/ 2001 respectively.

The interaction among planting density 58664 plants/ ha, boron level 1.0 kg. / ha and larger size of seed tubers (more than 55 mm.) gave higher marketable yield in both seasons.

**Keywords:** Potato Tubers , Planting density , Boron.

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