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نوع التربة	معدل التسرب* (مم/ساعة)	المسامية (%)	الكثافة الظاهرية (جم/سم <sup>3</sup> )	السعة الحقلية (%)	نقطة الذبول (%)	الماء الكلي المتاح	
						على اساس الحجم (%)	على اساس العمق (مم/م)
رملية Sand	50 (25-250)	38 (32-42)	1.65 (1.55-1.80)	15 (10-20)	7 (3-10)	8 (6-10)	80 (60-100)
لومية رملية Sandy Loam	25 (13-76)	43 (40-47)	1.50 (1.40-1.60)	21 (15-27)	9 (6-12)	12 (9-15)	120 (90-150)
لومية Loam	13 (8-20)	47 (43-49)	1.40 (1.35-1.50)	31 (25-36)	14 (11-17)	17 (14-20)	170 (140-200)
لومية طينية Clay Loam	8 (2.5-15)	49 (47-51)	1.35 (1.30-1.40)	36 (31-42)	18 (15-20)	19 (16-22)	190 (160-220)
طينية طميية Silty Clay	2.5 (0.3-5)	51 (49-53)	1.30 (1.20-1.40)	40 (35-45)	20 (17-22)	20 (18-23)	200 (180-230)
طينية Clay	0.5 (0.1-1)	53 (51-55)	1.25 (1.20-1.30)	44 (39-49)	21 (19-24)	23 (20-25)	230 (200-250)

يجب ملاحظة أن متوسط القيمة الصغرى والكبرى لكل خاصية موضوعة بين الأقواس ، كذلك معدل التسرب يتغير حسب بناء التربة ونسبة مكوناتها حتى عن القيم الموجودة بالجدول.

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المحصول	عمق الجذور (cm)	المحصول	عمق الجذور (cm)	المحصول	عمق الجذور (cm)
برسيم Alfalfa	120 - 180	بنجر Chard	60 - 90	الخوخ Peach	60 - 120
ليمون Almonds	60 - 120	الكرز Cherry	80 - 120	الفول السوداني Peanuts	40 - 80
تفاح Apple	80 - 120	الحمضيات Citrus	90 - 150	كمثرى Pear	60 - 120
مشمش Apricot	60 - 140	الذرة Corn	60 - 120	فلفل Pepper	60 - 90
خرشوف Artichoke	60 - 90	القطن Cotton	60 - 180	بطاطس Potatoes	60 - 90
موز Banana	30 - 60	خيار Cucumber	40 - 60	فجل Radish	30
شعير Barley	90 - 110	تين Fig	90	فول الصويا Soybean	60 - 90
فاصوليا Bean	50 - 90	كتان Flax	60 - 90	السبانخ Spinach	40 - 60
بنجر Beet	40 - 60	ليمون هندي Grapes	50 - 120	الفرولة Strawberry	30 - 50
كرنب Cabbage	60	خس Lettuce	20 - 50	قصب السكر Sugarcane	50 - 110
شمام Cantaloupe	60 - 120	بصل Onion	30 - 60	طماطم Tomato	60 - 120
جزر Carrot	40 - 60	جزر Parsnip	60 - 90	البيطيخ Watermelon	60 - 90
قرنبيط Cauliflower	60	عشب Pastures	30 - 80	القمح Wheat	80 - 110
كرفس Celery	60	البازلاء Peas	40 - 80		

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Crop	(mm)		(mm/day)					
	Cool		Moderate		Hot		desert	
Alfalfa	5.1	635	6.4	762	7.6	914	10.2	1219
Pasture	4.6	508	5.6	610	6.6	711	8.9	914
Grain	3.8	381	5.1	457	5.8	508	6.6	520
Beets	4.6	584	5.8	635	6.9	711	9.1	914
Beans	4.6	330	5.1	381	6.1	457	7.6	559
Corn	5.1	508	6.4	559	7.6	610	10.2	762
Cotton	5.1	508	6.4	559	7.6	660	10.2	813
Peas	4.6	305	4.8	330	5.1	356	5.6	356
Tomato	4.6	457	5.1	508	5.6	559	7.1	660
Potatoes	4.6	406	5.8	457	6.9	553	8.1	560
Melons	4.1	381	4.6	406	5.1	457	6.4	559
Strawberries	4.6	457	5.1	508	5.6	559	6.6	660
* Vegetables	4.1	305	4.6	356	5.1	406	6.3	508
Dec orchard	3.8	483	4.8	533	5.8	584	7.6	762
Citrus	4.1	508	4.6	559	5.1	660	5.6	711
Vineyards	3.6	356	4.1	406	4.8	457	6.4	610
Wheat	5.0	501	5.8	520	7.3	620	9.2	725

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	Cool	Moderate	Hot	desert
(T)	15.5 - 26.5	26.5 - 32	32 - 37.5	> 37.5
(RH)	70 %	60 %	50 %	40 %
(Ea)	85 %	80 %	75 %	65 %
(Tday)	16	14	12	10

**h<sub>f</sub>                      F                      ( )**

$h_f = f \cdot \frac{L}{d} \cdot \frac{V^2}{2g} \cdot F$		$h_f = K \cdot K_s \cdot L \cdot V^{1.9} \cdot d^{-1.1} \cdot F$		$h_f = K \cdot L \cdot \left( \frac{Q}{C_{HW}} \right)^{1.852} \cdot d^{-4.87} \cdot F$		
m = 2		m = 1.9		m = 1.852		
**	*	**	*	**	*	
1.000	1.000	1.000	1.000	1.000	1.000	
0.500	0.625	0.512	0.634	0.518	0.639	2
0.422	0.518	0.434	0.528	0.441	0.535	3
0.393	0.469	0.405	0.480	0.412	0.486	4
0.378	0.440	0.390	0.451	0.397	0.457	5
0.369	0.421	0.381	0.433	0.387	0.435	6
0.363	0.408	0.375	0.419	0.381	0.425	7
0.358	0.398	0.370	0.410	0.377	0.415	8
0.355	0.391	0.367	0.402	0.374	0.409	9
0.353	0.385	0.365	0.396	0.371	0.402	10
0.351	0.380	0.363	0.392	0.369	0.397	11
0.349	0.376	0.361	0.388	0.367	0.394	12
0.348	0.373	0.360	0.381	0.366	0.387	13
0.347	0.370	0.358	0.381	0.365	0.387	14
0.346	0.366	0.357	0.379	0.364	0.384	15
0.345	0.365	0.357	0.377	0.363	0.382	16
0.344	0.363	0.356	0.375	0.362	0.380	17
0.343	0.361	0.355	0.373	0.361	0.379	18
0.343	0.360	0.355	0.372	0.361	0.377	19
0.342	0.359	0.354	0.370	0.360	0.376	20
0.341	0.357	0.353	0.368	0.359	0.374	22
0.341	0.355	0.352	0.366	0.359	0.372	24
0.340	0.353	0.351	0.364	0.358	0.370	26
0.340	0.351	0.351	0.363	0.357	0.369	28
0.339	0.350	0.350	0.362	0.357	0.368	30
0.338	0.347	0.350	0.359	0.356	0.365	35
0.338	0.345	0.349	0.357	0.355	0.364	40
0.337	0.343	0.348	0.355	0.354	0.361	50
0.335	0.338	0.347	0.350	0.353	0.356	100
	0.333		0.345		0.351	< 100

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	0-5 %	5-8 %	8-12 %	12-16 %
	( / )	( / )	( / )	( / )
,	50	38	25	13
	38	25	19	10
,	25	20	15	10
	19	13	10	8
,	13	10	8	5
	8	6	4	2.5
	4	4	2	1.5

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(S <sub>s</sub> )	(km/hr)
(D <sub>w</sub> ) %	
(D <sub>w</sub> ) %	
(D <sub>w</sub> ) %	

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(S <sub>s</sub> ) (S <sub>l</sub> )	( / )
S <sub>l</sub> = 60 % × D <sub>w</sub> S <sub>s</sub> = 50 % × D <sub>w</sub>	
S <sub>l</sub> = 60 % × D <sub>w</sub> S <sub>s</sub> = 45 % × D <sub>w</sub>	
S <sub>l</sub> = 60 % × D <sub>w</sub> S <sub>s</sub> = 40 % × D <sub>w</sub>	

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(S <sub>s</sub> ) (D <sub>w</sub> )	(S <sub>s</sub> ) (D <sub>w</sub> )	( / )
%	%	
%	%	
%	%	
%	%	

(Ss×SL)

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Ss x SL	R <sub>a</sub> (mm/hr) →	4.6 - 5.6	5.8 - 6.8	7.1 - 8.1	8.4 - 9.4	9.7 - 10.7	10.9-11.9	12.2-13.2
6 x 12	d <sub>nozzle</sub> (mm)	2.38	2.78	3.18	3.18	3.57	3.18*2.38	3.18*2.38
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	3.17	2.46	2.39	2.81	2.46	2.25	2.81
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.36	0.50	0.57	0.66	0.77	0.84	0.95
	D <sub>w</sub> (m)	21.95	21.95	22.56	23.78	24.39	22.56	23.17
	C <sub>u</sub> (%)	84.00	84.00	84.00	84.00	84.00	90.00	90.00
9 x 12	d <sub>nozzle</sub> (mm)	2.78	3.18	3.57	3.97	3.57*2.38	3.97*2.38	3.97*2.38
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	3.17	3.31	3.17	2.81	2.67	2.46	3.03
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.57	0.68	0.86	1.04	1.11	1.25	1.41
	D <sub>w</sub> (m)	22.87	25.30	25.91	27.13	23.48	25.91	26.83
	C <sub>u</sub> (%)	82.00	83.00	83.00	85.00	88.00	88.00	90.00
9 x 15	d <sub>nozzle</sub> (mm)	3.18	3.57	3.97	3.97	4.37	3.97*3.18	4.37* 2.38
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	3.17	3.52	3.17	3.87	3.87	2.81	3.24
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.70	0.91	1.11	1.23	1.41	1.64	1.77
	D <sub>w</sub> (m)	25.30	26.22	27.44	27.74	29.57	26.52	28.05
	C <sub>u</sub> (%)	86.00	86.00	84.00	85.00	86.00	86.00	90.00
12 x 12	d <sub>nozzle</sub> (mm)	3.57	3.18*2.38	3.97*2.38	3.97*2.38	3.97*3.18	4.97*2.38	4.97*3.18
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	2.46	2.81	2.46	2.81	2.46	2.81	3.03
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.77	0.95	1.20	1.36	1.52	1.68	1.88
	D <sub>w</sub> (m)	25.91	23.71	25.61	27.13	25.91	27.74	27.74
	C <sub>u</sub> (%)	86.00	87.00	88.00	89.00	90.00	90.00	90.00
9 x 18	d <sub>nozzle</sub> (mm)	3.57	3.97	4.37	4.76	4.76	5.16	5.56
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	3.17	3.17	3.17	3.17	3.87	3.66	3.52
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.86	1.11	1.29	1.54	1.73	1.93	2.16
	D <sub>w</sub> (m)	25.91	27.44	28.66	30.49	31.10	31.40	32.32
	C <sub>u</sub> (%)	88.00	89.00	88.00	85.00	87.00	84.00	89.00
12 x 15	d <sub>nozzle</sub> (mm)	3.97	3.97*2.38	3.97*2.38	4.37*2.38	4.76*2.38	4.76*3.18	5.16*3.18
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	2.46	2.46	3.17	2.81	2.81	3.17	3.17
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.98	1.25	1.48	1.68	1.88	2.13	2.38
	D <sub>w</sub> (m)	26.83	25.91	26.83	27.74	28.96	29.57	30.49
	C <sub>u</sub> (%)	78.00	83.00	84.00	88.00	89.00	90.00	90.00
12 x 18	d <sub>nozzle</sub> (mm)	3.97	4.37	4.76	5.16	5.56	5.16*3.18	5.56*3.18
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	3.52	3.87	3.87	3.87	3.87	3.52	3.73
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	1.18	1.41	1.70	1.98	2.27	2.54	2.82
	D <sub>w</sub> (m)	27.74	29.57	31.10	31.71	32.62	30.79	32.01
	C <sub>u</sub> (%)	83.00	85.00	85.00	84.00	86.00	88.00	86.00
18 x 18	d <sub>nozzle</sub> (mm)	4.76	5.16	5.56	5.56	6.35	5.56*4.76	6.35*4.64
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	4.22	4.57	4.57	5.63	4.79	3.52	3.52
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	1.77	2.20	2.52	2.86	3.45	3.77	4.34
	D <sub>w</sub> (m)	38.41	39.63	40.65	42.68	42.68	36.59	38.11
	C <sub>u</sub> (%)	88.00	88.00	88.00	88.00	88.00	84.00	88.00

(Ss×SL)

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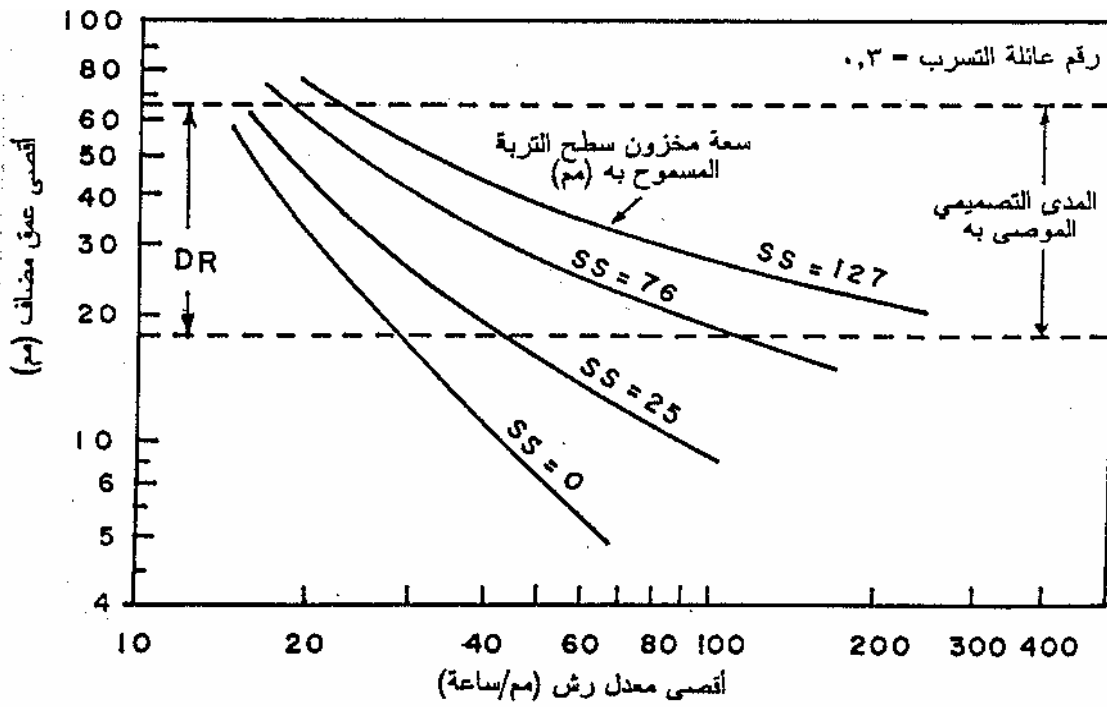
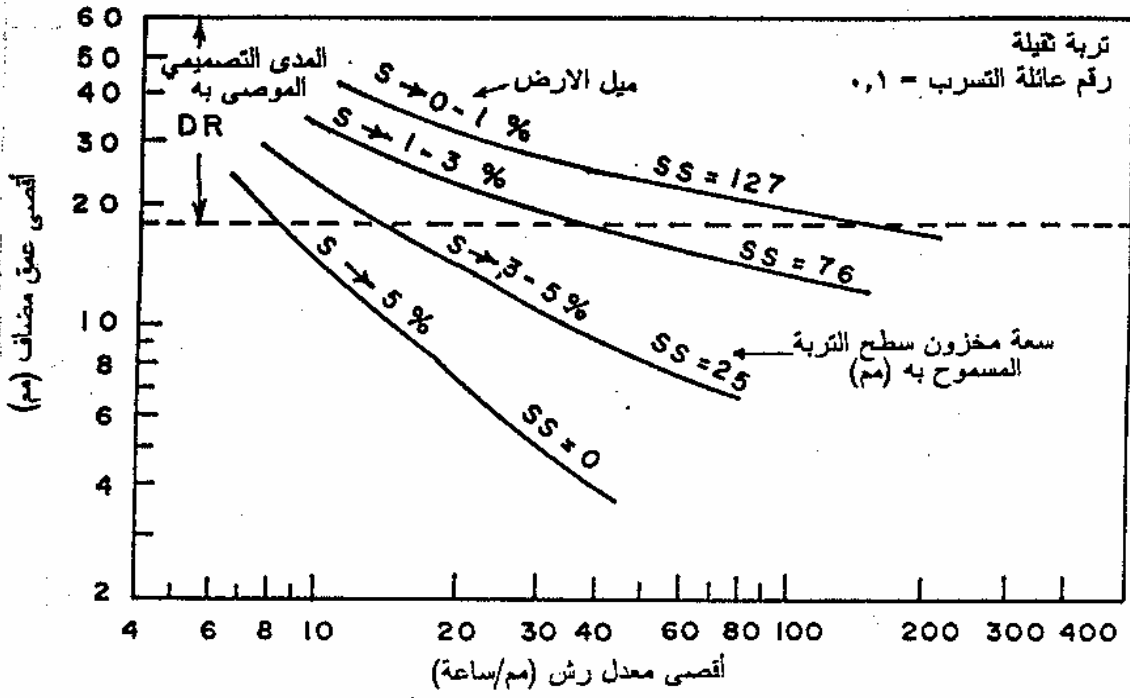
Ss x SL	R <sub>a</sub> (mm/hr) →	4.6 - 5.6	5.8 - 6.8	7.1 - 8.1	8.4 - 9.4	9.7 - 10.7	10.9-11.9	12.2-13.2
6 x 12	d <sub>nozzle</sub> (mm)	2.38	2.78	3.18	3.18	3.57	3.18*2.38	3.18*2.38
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	3.17	2.46	2.39	2.81	2.46	2.25	2.81
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.36	0.50	0.57	0.66	0.77	0.84	0.95
	D <sub>w</sub> (m)	19.82	19.51	20.43	21.95	21.95	20.43	21.64
	C <sub>u</sub> (%)	84.00	84.00	84.00	84.00	84.00	85.00	86.00
9 x 12	d <sub>nozzle</sub> (mm)	2.78	3.18	3.57	3.97	3.57*2.38	3.97*2.38	3.97*2.38
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	3.17	3.31	3.17	2.81	2.67	2.46	3.03
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.57	0.68	0.86	1.04	1.11	1.25	1.41
	D <sub>w</sub> (m)	20.43	22.87	23.17	24.39	21.34	23.17	24.09
	C <sub>u</sub> (%)	85.00	82.00	83.00	84.00	85.00	88.00	90.00
9 x 15	d <sub>nozzle</sub> (mm)	3.18	3.57	3.97	3.97	4.37	4.76	4.37*2.38
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	3.17	3.52	3.17	3.87	3.87	3.52	3.24
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.70	0.91	1.11	1.23	1.41	1.64	1.77
	D <sub>w</sub> (m)	22.87	23.48	24.70	25.00	26.52	27.74	25.30
	C <sub>u</sub> (%)	86.00	86.00	84.00	85.00	86.00	86.00	90.00
12 x 12	d <sub>nozzle</sub> (mm)	3.57	3.18*2.38	3.97*2.38	3.97*2.38	3.97*3.18	3.97*2.38	3.97*3.18
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	2.46	2.81	2.46	2.81	2.46	2.81	3.03
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.77	0.95	1.20	1.36	1.52	1.68	1.88
	D <sub>w</sub> (m)	22.87	21.04	23.17	23.78	23.17	25.00	25.00
	C <sub>u</sub> (%)	83.00	83.00	84.00	87.00	86.00	86.00	90.00
9 x 18	d <sub>nozzle</sub> (mm)	3.57	3.97	4.37	4.76	4.76	5.16	5.56
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	3.17	3.17	3.17	3.17	3.87	3.66	3.52
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.86	1.11	1.29	1.54	1.73	1.93	2.16
	D <sub>w</sub> (m)	23.17	24.70	25.91	27.44	28.05	28.35	28.96
	C <sub>u</sub> (%)	84.00	84.00	84.00	84.00	86.00	86.00	87.00
12 x 15	d <sub>nozzle</sub> (mm)	3.97	3.97*2.38	3.97*2.38	4.37*2.38	4.76*2.38	4.76*3.18	5.16*3.18
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	2.46	2.46	3.17	2.81	2.81	3.17	3.17
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.98	1.25	1.48	1.68	1.88	2.13	2.38
	D <sub>w</sub> (m)	24.09	23.17	24.09	25.00	25.91	26.52	27.44
	C <sub>u</sub> (%)	76.00	76.00	76.00	83.00	84.00	85.00	88.00
12 x 18	d <sub>nozzle</sub> (mm)	3.97	4.37	4.76	5.16	5.56	5.16*3.18	5.56*3.18
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	3.52	3.87	3.87	3.87	3.87	3.59	3.73
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	1.18	1.41	1.70	1.98	2.27	2.54	2.82
	D <sub>w</sub> (m)	25.00	26.52	28.05	28.66	29.27	27.74	28.66
	C <sub>u</sub> (%)	77.00	81.00	83.00	84.00	85.00	80.00	82.00
18 * 18	d <sub>nozzle</sub> (mm)	4.76	5.16	5.56	5.56	6.35	5.56*4.76	6.35*4.64
	p <sub>sp</sub> (kg/cm <sup>2</sup> )	4.22	4.57	4.57	5.63	4.79	3.52	3.52
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	1.77	2.20	2.52	2.86	3.45	3.77	4.34
	D <sub>w</sub> (m)	32.62	33.64	35.06	36.28	37.80	31.10	33.84
	C <sub>u</sub> (%)	80.00	82.00	83.00	84.00	84.00	78.00	83.00

(Ss×SL)

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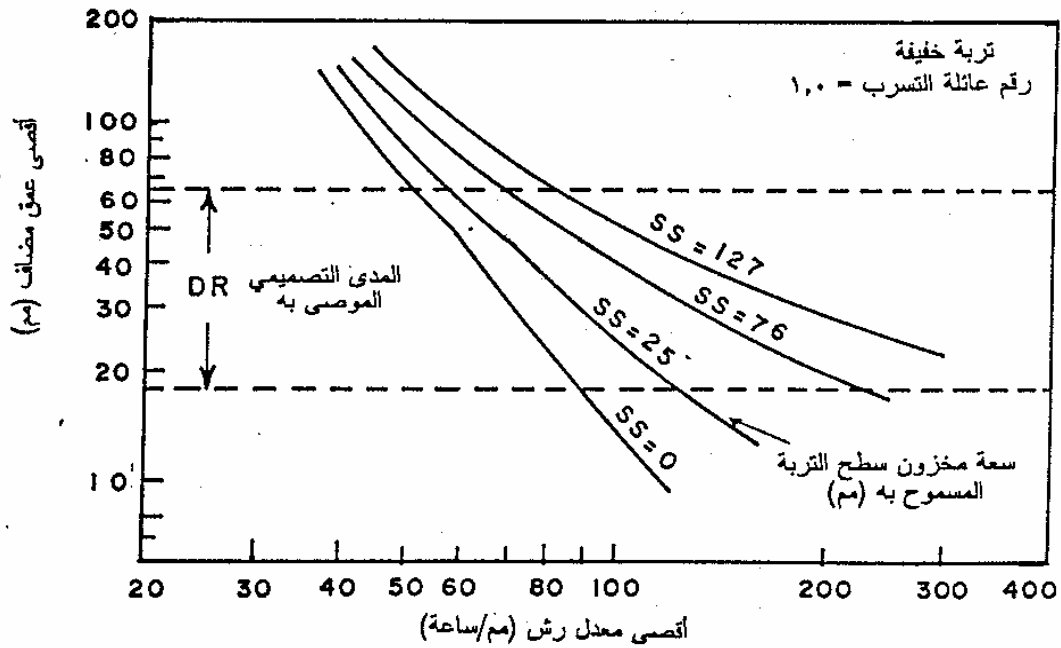
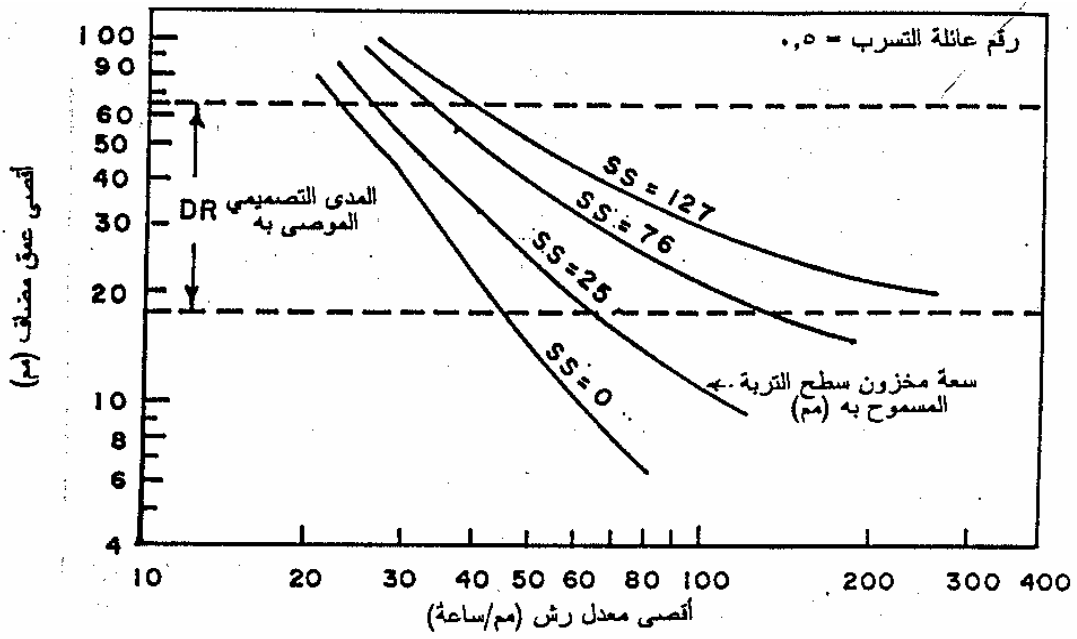
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Ss x SL	R <sub>a</sub> (mm/hr) →	4.6 - 5.6	5.8 - 6.8	7.1 - 8.1	8.4 - 9.4	9.7 - 10.7	10.9- 11.9	12.2-13.2
6 x 12	d <sub>nozzle</sub> (mm)	2.38	2.78	3.18	3.18	3.57	3.57	3.97
	P <sub>sp</sub> (kg/cm <sup>2</sup> )	3.17	2.46	2.39	2.81	2.46	3.17	2.60
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.36	0.50	0.57	0.66	0.77	0.86	0.98
	D <sub>w</sub> (m)	16.46	17.68	18.29	18.90	19.82	20.73	21.34
	C <sub>II</sub> (%)	84.00	85.00	85.00	84.00	85.00	83.00	83.00
9 x 12	d <sub>nozzle</sub> (mm)	2.78	3.18	3.57	3.97	3.97	4.37	3.97*2.38
	P <sub>sp</sub> (kg/cm <sup>2</sup> )	3.17	3.31	3.17	2.81	3.24	3.17	3.03
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.57	0.68	0.86	1.04	1.14	1.29	1.41
	D <sub>w</sub> (m)	18.29	20.43	20.73	21.95	22.26	22.56	21.65
	C <sub>II</sub> (%)	80.00	84.00	84.00	85.00	86.00	87.00	84.00
9 x 15	d <sub>nozzle</sub> (mm)	3.18	3.57	3.97	3.97	4.37	4.76	5.16
	P <sub>sp</sub> (kg/cm <sup>2</sup> )	3.17	3.52	3.17	3.87	3.87	3.52	3.17
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.68	0.91	1.11	1.23	1.41	1.64	1.79
	D <sub>w</sub> (m)	20.43	21.04	22.26	22.56	23.78	24.70	25.00
	C <sub>II</sub> (%)	81.00	82.00	87.00	88.00	88.00	88.00	89.00
12 x 12	d <sub>nozzle</sub> (mm)	3.57	3.97	4.37	4.37	4.76	4.37*2.38	4.37*3.18
	P <sub>sp</sub> (kg/cm <sup>2</sup> )	2.46	2.46	2.46	3.52	3.17	2.81	3.03
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.77	0.98	1.23	1.36	1.52	1.68	1.88
	D <sub>w</sub> (m)	20.43	21.34	21.95	23.48	24.70	22.56	22.56
	C <sub>II</sub> (%)	82.00	81.00	80.00	86.00	85.00	85.00	87.00
9 x 18	d <sub>nozzle</sub> (mm)	3.57	3.97	4.37	4.76	4.76	5.16	5.56
	P <sub>sp</sub> (kg/cm <sup>2</sup> )	3.17	3.17	3.17	3.17	3.87	3.52	3.52
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.86	1.11	1.29	1.54	1.73	1.93	2.16
	D <sub>w</sub> (m)	20.73	22.26	23.17	24.70	25.30	25.61	25.91
	C <sub>II</sub> (%)	72.00	75.00	81.00	84.00	86.00	86.00	88.00
12 x 15	d <sub>nozzle</sub> (mm)	3.97	3.97	4.37	4.76	5.16	5.16	5.16*3.18
	P <sub>sp</sub> (kg/cm <sup>2</sup> )	2.46	3.87	3.87	3.80	3.52	3.52	3.17
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	0.98	1.23	1.41	1.68	1.88	2.16	2.38
	D <sub>w</sub> (m)	21.65	22.56	23.17	24.70	25.61	25.91	24.70
	C <sub>II</sub> (%)	77.00	78.00	80.00	80.00	82.00	83.00	78.00
12 x 18	d <sub>nozzle</sub> (mm)	3.97	4.37	4.76	5.16	5.56	5.56	5.56*3.18
	P <sub>sp</sub> (kg/cm <sup>2</sup> )	3.52	3.87	3.87	3.87	3.87	4.57	3.73
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	1.18	1.41	1.70	1.98	2.27	2.52	2.82
	D <sub>w</sub> (m)	22.56	23.78	25.30	28.96	28.96	30.18	25.91
	C <sub>II</sub> (%)	68.00	74.00	78.00	84.00	85.00	86.00	80.00
18 x 18	d <sub>nozzle</sub> (mm)	4.76	5.16	5.56	5.56	6.35	6.35	6.35*4.76
	P <sub>sp</sub> (kg/cm <sup>2</sup> )	4.22	4.57	4.57	5.63	4.79	5.63	3.52
	Q <sub>sp</sub> (m <sup>3</sup> /hr)	1.77	2.20	2.52	2.86	3.45	3.82	4.34
	D <sub>w</sub> (m)	27.74	28.96	30.18	32.32	34.15	35.06	30.49
	C <sub>II</sub> (%)	64.00	66.00	68.00	80.00	82.00	83.00	78.00



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