



# MELSON

WATER APPLICATION SOLUTIONS



WATER APPLICATION SOLUTIONS





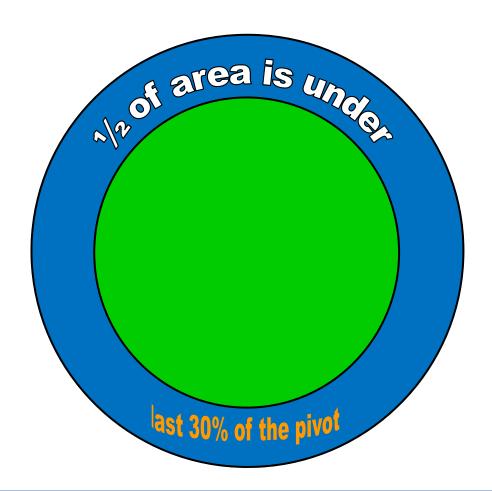
#### CENTER PIVOT SYSTEMS

- Uniformity Advantages
- Application Efficiency
- Labor Savings
- Energy Savings
- Dependable
- Cost Effective





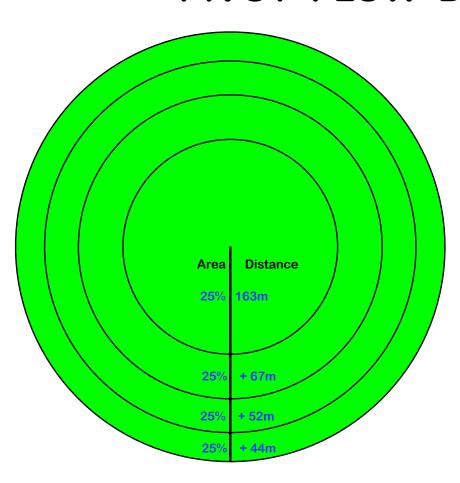
## PIVOT FLOW DISTRIBUTION







## PIVOT FLOW DISTRIBUTION



#### 500 Mu Pivot

<u>% of Area</u>	<u>Distance</u>	<u>Total Mu</u>
<b>25</b> %	163 m	125
<b>50</b> %	230 m	250
<b>75</b> %	282 m	375
100 %	326 m	500
140 %	386 m	700



Nozzle sizes get larger as we move from the pivot point outward because each sprinkler as we move outward waters more area than the sprinkler before it.









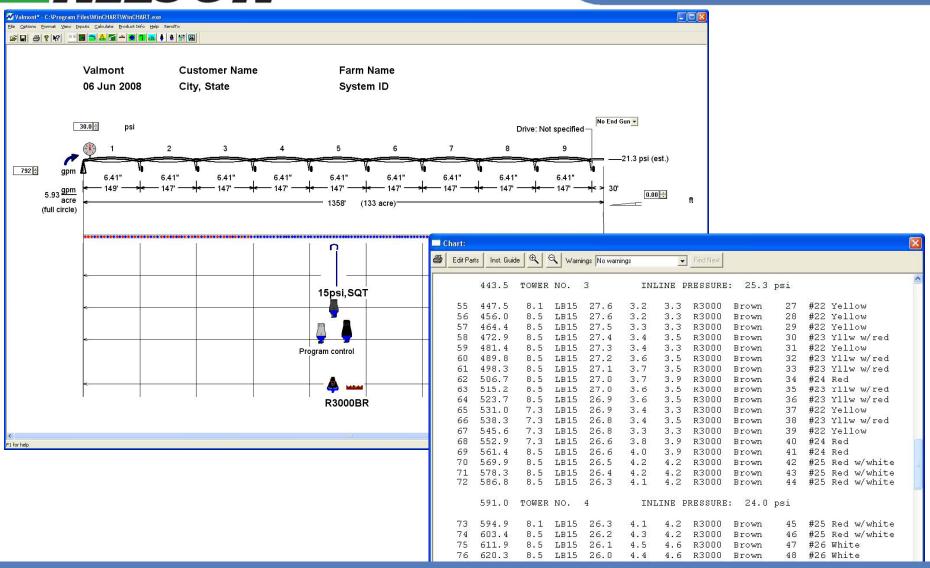








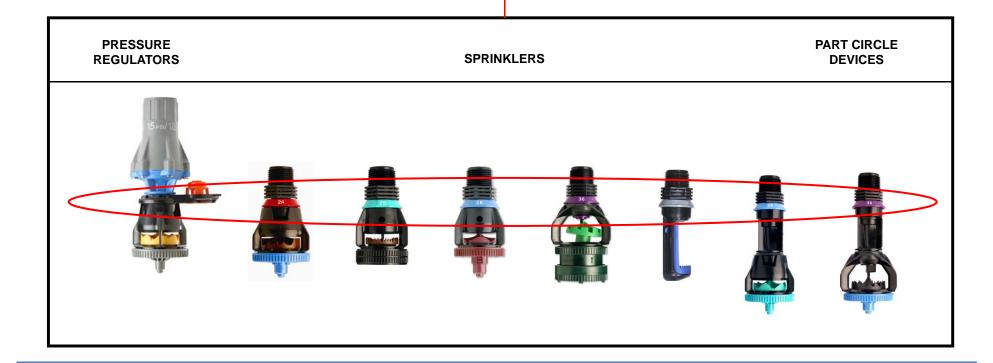




**Precisely Designed Nozzle Selection** 







**3TN Nozzle System -THE FOUNDATION** 





#### THE FOUNDATION



**Precisely Designed Nozzle Selection** 



#### THE FOUNDATION

# **Pressure Regulators Deliver**

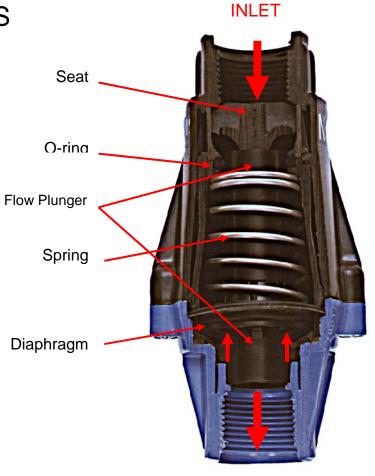
- Precise pressure at every sprinkler.
- Eliminates the effect of field slope on sprinkler pressure.
- Eliminates the effect of pivot pipe friction loss.



### **Exact Pressure at Every Sprinkler**



#### **INNER WORKINGS**



**OUTLET** 

**Exact Pressure at Every Sprinkler** 





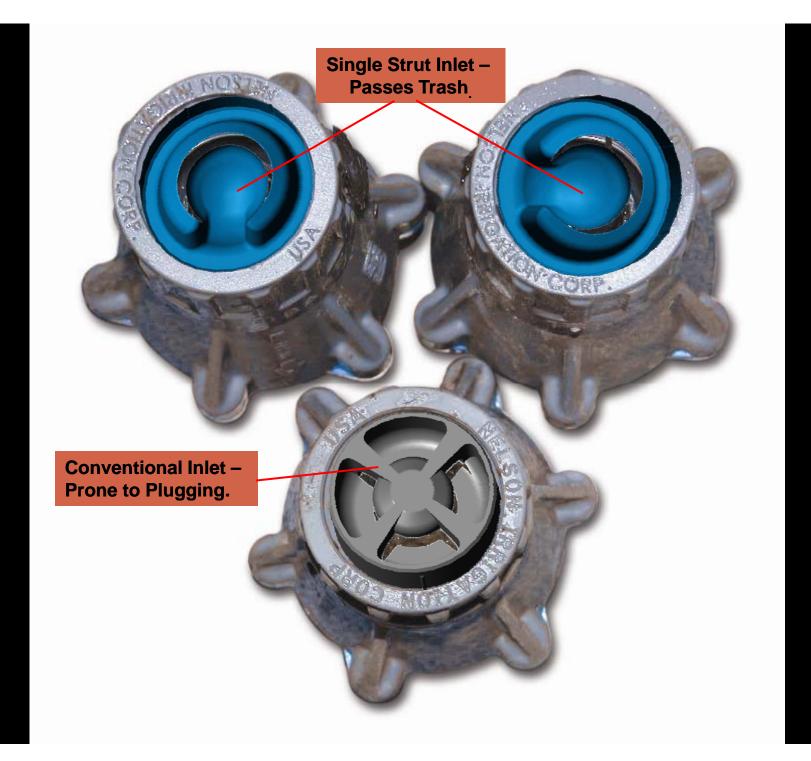




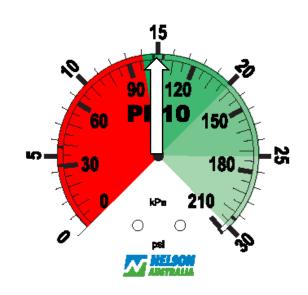


**Universal Flo** 

NEW! Single Strut Technology™







A 0.7 bar regulator needs at least 0.97 bar at the end of the system to operate reliably.

(1.0 bar regulators need 1.27 bar, 1.4 bar regulators need 1.67 bar)

The end pressure MUST be at least 0.27 bar above the regulator pressure



#### > 3000 Series 3TN Nozzle System > Metric Units (LPM)

- Quick-Change
- Color-Coded
- Precision Accuracy
- ■High Wear Resistance



The nozzle sizing system is based on 128th inch increments, i.e. 3TN Nozzle #22 has an orifice diameter of 22/128th inches while 3TN Nozzle #23 has an orifice diameter of 23/128th inches. Odd numbered nozzles have a color box around the number marking. This color box denotes the color of next larger nozzle size.

#	#9	#10	#11	#12	#13	#14	#15	#16	#17	#18	#19
Color	Light Blue	Beige	Beige	Gold	Gold	Lime	Lime	Lavender	Lavender	Gray	Gray
Stripe	Beige		Gold		Lime		Lavender		Gray		Turquoise
BAR	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM
0.4	1.28	1.59	1.89	2.30	2.68	3.10	3.59	4.08	4.61	5.14	5.79
0.7	1.66	2.04	2.46	2.99	3.48	4.01	4.65	5.29	5.98	6.62	7.45
1.0	2.00	2.50	2.99	3.63	4.27	4.88	5.71	6.47	7.30	8.09	9.12
1.4	2.34	2.87	3.48	4.20	4.92	5.63	6.58	7.49	8.44	9.38	10.56
1.7	2.61	3.22	3.86	4.69	5.52	6.32	7.38	8.36	9.46	10.48	11.81
2.1	2.87	3.52	4.23	5.14	6.01	6.92	8.09	9.15	10.37	11.46	12.90
2.8	3.29	4.05	4.88	5.94	6.96	7.98	9.34	10.59	11.96	13.24	14.91
3.4	3.67	4.54	5.48	6.66	7.79	8.93	10.44	11.84	13.32	14.79	16.69

#	#20	#21	#22	#23	#24	#25	#26	#27	#28	#29	#30
Color	Turquoise	Turquoise	Yellow	Yellow	Red	Red	White	White	Blue	Blue	Dark Brown
Stripe		Yellow		Red		White		Blue		Dark Brown	
BAR	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM
0.4	6.43	6.96	7.72	8.40	9.23	9.99	10.86	11.61	12.68	13.55	14.49
0.7	8.28	9.00	9.99	10.82	11.96	12.90	14.00	15.00	16.35	17.48	18.69
1.0	10.18	11.01	12.22	13.24	14.61	15.78	17.14	18.39	20.02	21.42	22.93
1.4	11.73	12.71	14.11	15.32	16.88	18.24	19.79	21.23	23.12	24.71	26.45
1.7	13.13	14.23	15.78	17.10	18.88	20.36	22.14	23.73	25.85	27.63	29.59
2.1	14.38	15.59	17.25	18.77	20.70	22.33	24.26	26.00	28.31	30.28	32.39
2.8	16.61	18.01	19.94	21.65	23.88	25.77	28.00	30.65	32.70	34.97	37.43
3.4	18.54	20.13	22.29	24.22	26.72	28.80	31.33	33.57	36.56	39.13	41.86

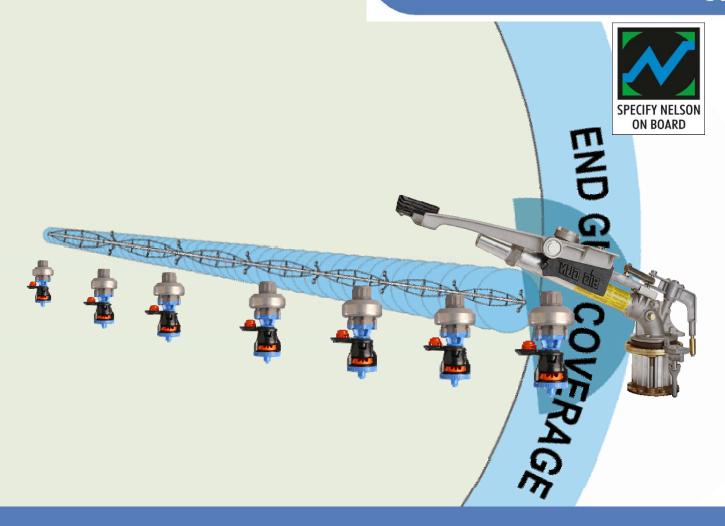
**Precisely Designed Nozzle Selection** 



#	#31	#32	#33	#34	#35	#36	#37	#38	#39	#40	#41
Color	Dark Brown	Orange	Orange	Dark Green	Dark Green	Purple	Purple	Black	Black	Dark	Dk. Turquoise
Stripe	Orange		Dark Green		Purple		Black		Dk. Turquoise	Turquoise	Mustard
BAR	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM
0.4	15.36	16.50	17.60	18.69	19.68	20.07	22.10	23.39	24.68	25.92	27.48
0.7	19.83	21.50	22.71	24.11	25.43	26.72	28.54	30.16	31.87	33.49	35.47
1.0	24.26	26.07	29.71	29.56	31.15	32.74	34.97	36.98	39.02	41.02	43.45
1.4	28.00	30.12	32.13	34.10	35.95	37.77	40.38	42.69	45.08	47.35	50.19
1.7	31.34	33.68	35.91	38.15	40.19	42.24	45.11	47.72	50.38	52.95	56.09
2.1	34.32	36.90	39.32	41.78	44.05	46.29	49.43	52.27	55.19	58.02	61.43
2.8	36.62	42.62	45.42	48.25	50.87	53.44	57.07	60.37	63.74	66.99	70.97
3.4	44.32	47.65	50.79	53.93	56.85	59.76	63.81	67.48	71.20	74.90	79.33

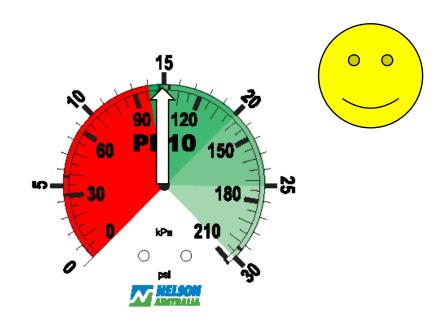
#	#42	#43	#44	#45	#46	#47	#48	#49	#50
Color	Mustard	Mustard	Maroon	Maroon	Cream	Cream	Dark Blue	Dark Blue	Copper
Stripe		Maroon		Cream		Dark Blue		Copper	
BAR	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM
0.4	28.76	30.13	31.52	33.04	34.51	36.26	37.69	39.02	40.76
0.7	37.13	38.91	40.68	42.66	44.54	46.78	48.67	50.38	52.64
1.0	45.45	47.65	49.84	52.23	54.54	57.30	59.61	61.70	64.45
1.4	52.49	55.03	57.53	60.30	62.98	66.20	68.84	71.23	74.45
1.7	58.70	61.51	64.34	67.41	70.43	74.00	79.94	79.67	83.23
2.1	64.30	67.37	70.47	73.85	77.13	81.07	84.32	87.24	91.18
2.8	74.22	77.82	81.37	85.28	89.09	93.60	97.35	100.76	105.29
3.4	83.00	86.98	90.99	95.34	99.58	104.66	108.85	112.64	117.71

This flow data was obtained under ideal test conditions and may be adversely affected by poor hydraulic entrance conditions, turbulence or other factors. Nelson Irrigation makes no representation regarding sprinkler flow rate accuracy undervarious plumbing and drop pipe conditions.



Nozzles MUST be in the correct locations as shown in the sprinkler chart



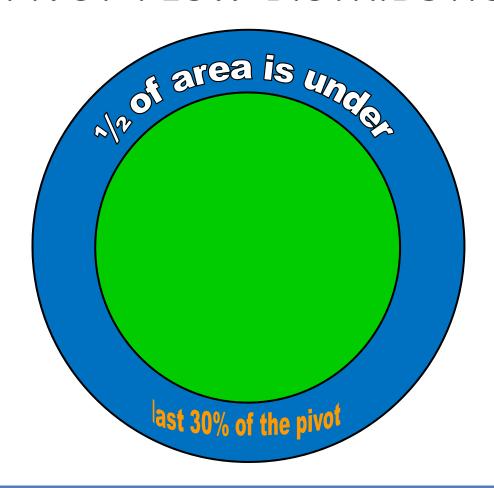


Do not operate a centre pivot with less than the minimum operating pressure at the end of the machine

The end pressure MUST be at least 0.27 bar above the regulator pressure



### PIVOT FLOW DISTRIBUTION





#### **Dual Nozzle Clip**

Pre-irrigation
Germination
Chemigation
Low well levels



Lower application rate Gentler Droplets Minimize Compaction Save Water & Energy





**Match Application Rate to Demand** 

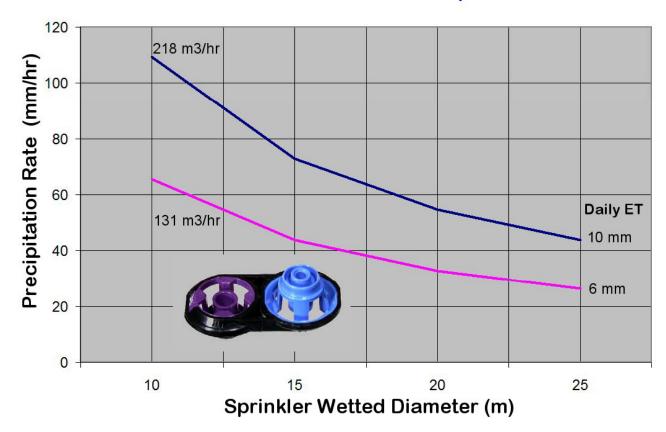




#### **Last Tower Precipitation Rates**

Pivot Length 400 m

With Dual Nozzle Clip



## **Match Application Rate to Demand**



WATER APPLICATION SOLUTIONS





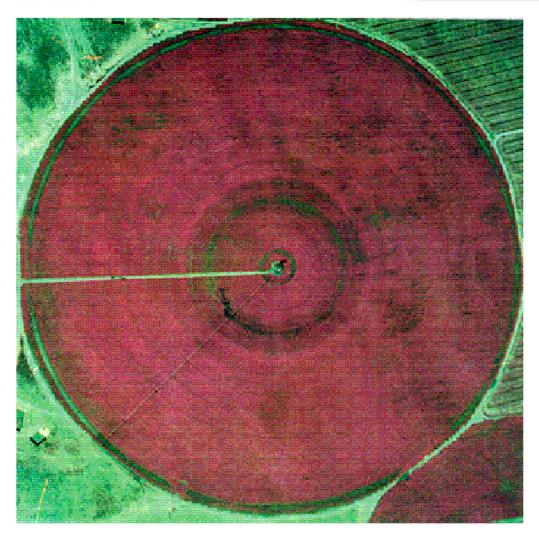
- Why pay attention?
- How much does it cost?
- What is the potential return?

# Irrigation Uniformity









**Uniformity Issues** 







**High Uniformity** 



# **Modern Pivot Sprinklers Deliver High Uniformity**

- Multi trajectory streams.
- Engineered droplet size.
- Wide coverage diameter.
- Long product life.
- Continuously moving pivot enhances uniformity.





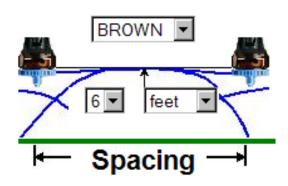




**Modern Sprinklers = High Uniformity** 



#### HIGHEST UNIFORMITY IN THE INDUSTRY



Uniformity values indicate the lowest predicted Christiansen's Uniformity, CU, at any spacing within the limits of the sprinkler. High values indicate that the product can be used with relative safety throughout the spacing range. Application of the product in conditions for which the tabulated values are lower may require additional analysis to determine the most advantageous spacing. Nelson Irrigation Corporation makes no representation regarding droplet conditions, uniformity, or application rate.

		Nozzle Size									
psi	14	16	18	20	24	28	32	36	40	44	50
15	90	90	95	95	95	95	95	95	95	95	95
20	90	90	95	95	95	95	95	95	95	95	95
25	90	95	95	95	95	95	95	95	95	95	95

R3000 vm1 2007-03-27

**Modern Sprinklers = High Uniformity** 





#### Bradley A. King, Jeffrey C. Stark, and Dennis C. Kincaid

is becoming a major theme for producers in order to maintain or increase their economic return in an increasingly competitive global market. In the case of irrigated agriculture, producers must also address increasing public concern about water conservation, water quality, and environmental protection.



Two irrigation management issues require attention in order to maximize production efficiency. These are irrigation scheduling and irrigation uniformity. Irrigation scheduling involves determining the proper amount and timing of water applications throughout the growing season. Proper irrigation scheduling results in irrigation applications that supply the water needs of the crop without the development of deficit or excess soil moisture conditions.

## WHY DO YOU WANT HIGH UNIFORMITY?



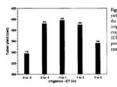
duce crop yield and/or quality. For example. Figure 1 shows the impact of over- and under-irrigation on potato yield. The data shown in Figure 1 were collected from an irrigation manage-ment study of 45 commercial fields under sprinkler irrigation in southeastern Idaho during 1995. A mere 10 per-cent departure of seasonal water application from seasonal evapotranspi-ration (ET) can begin to decrease tuber yield and impact quality. Yield re-duction due to over-irrigation can be attributed to poor soil acration, increased incidence of disease, and leaching of mobile nutrients below the crop root sone. In general, over- and un der-irrigation adversely impact the yield and quality of all crops. While the results shown in Figure 1

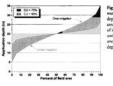
emphasize the importance of proper irrigation scheduling in attaining maxi m yield and quality, irrigation uniformity is just as important. Irrigation uniformity describes how evenly an irrigation system distributes water over the field area. The most common quantitative measure of irrigation uni-formity is the Christiansen uniformity

sus field area. The cumulative fre-shown in Figure 2 stems from the coefficient (CU). The CU provides a quency distributions shown in Figure quantitative measure of the average deviation from the mean application microirrigation systems. Figure 2 ample, 20 percent of the field area re-depth relative to the mean application graphically shows cumulative water ceives 13.9 inches of water or less when depth extrave to the mean application is depth, When wave application is depth, When wave application is per application is per feetly uniform, which is impossible on a field scale, the CU is 100 percent.

Field evaluation of imigation uniform inches, by definition of any application in the integration system has a CU of 90 and 90 percent with a seapercent compared to 0 percent of the 
site of the extravel of the percent of the 
inches, by definition, half of the field has a CU of 90 percent. Assuming seatimes, by definition, half of the field has a CU of 90 percent. Assuming seamity requires considerable effort. De-area receives less than the average ap-plication depth and half of the field shown in Figure 1 is 20 inches, a seacolours, and achieving of the Cura be found in the American Society of Agricultural Engineers Standards and in greater of the Society of Societ The numerical significance of the

The numerical significance of the





CU is illustrated in Figure 2 using a plication depth for a 70 percent CU percent of the field area would receive cumulative frequency distribution of versus a 90 percent CU.

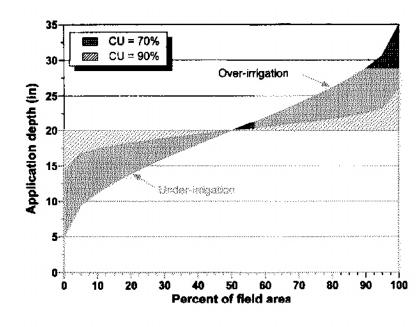


Figure 2. Seasonal water application depth versus field area for two levels of irrigation uniformity and an average application depth of 20 inches.



WHY DO YOU WANT HIGH UNIFORMITY?



when having a CU of 70 percent, but water application can be reduced by additional irrigation, but overall proceed to shan 17 inches with a CU of 90 percent. Maximum yield is expected to occur on 34 percent of the field when the irrigation on years may a CU of 90 percent. Thus, the control of the process of the field, when the irrigation on years may be present of the field, when the irrigation on years may be present of the field, when the irrigation on years may be present of the field, when the irrigation on years may be present of the field when the irrigation on years may be present on the present of the field when the irrigation on years may be present on the present of the field when the irrigation of years application, and the operating of the field when the irrigation of years application, and the operating of the present of the field when the irrigation of years application are capable of high irrigation of years application and the operation of the field, and the present of the field when the irrigation of the present of the field when the irrigation of the present of the field when the irrigation of the present of the field when the irrigation of the field w total yield would be lower with the lower uniformity since a much larger portion of the field would receive over-or under-irrigation. This is summaor under-trigation. In its summa-rized in Figure 3 which shows the ex-pected yield distribution at both CU levels resulting from combining the data of Figures 1 and 2. Overall, total vield increases 6 percent, from 362 cwt/ac to 385 cwt/ac, by increasing the CU from 70 percent to 90 percent. effects on yield, quality, and gross re ceipes are summerized in Table 1. Tu-ber quality data is based on the 1995 irrigation study depicted in Figure 1. The estimated increase in gross receipts firm increasing CU from 70 to 90 per-cent is \$144/acre. Smaller increases in CU would generate smaller increases in gross receipts. Tuber quality will likely be more variable when the irrigation system has a low CU. The per-centage of field area receiving deficit

#### **Field Scale Yield Distribution**

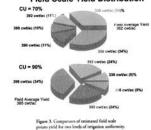


Table 1. Estimated irrigation uniformity effects on yield, grade and gross receipts for Russer Burbank

Irrigation	200000112	Yield		Incentive			
Uniformity	Total certisor	U.S. No. 1's confector	7 to 14 or. centace	Adjusted Price S/ows	Gross Receipt \$/acm		
70%	362	277	138	4.74	1716		
90%	385	310	148	4.83	1860		
Difference	23	33	10	0.09	144		

#### Field Scale Yield Distribution

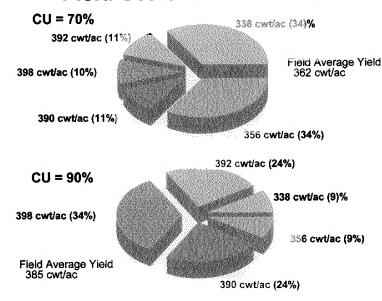


Figure 3. Comparison of estimated field scale potato yield for two levels of irritation uniformity



WHY DO YOU WANT HIGH UNIFORMITY?



crive lens than 17 inches with a CU of 
90 percent. Manisumum yield is expected to occur on 34 percent of the 
first pected to occur on 34 percent of the 
field when the irrigation oystem has 
CU of 90 percent but only on 10 perent of the field when the irrigation 
yutern has a CU of 70 percent. Thus, 
coat yield would be lower with the lower uniformity since a much larger tower uniformity since a much larger portion of the field would receive over-or under-irrigation. This is summa-rized in Figure 3 which shows the ex-pected yield distribution at both CU levels resulting from combining the data of Figures 1 and 2. Overall, total vield increases 6 percent, from 362 cwt/ac to 385 cwt/ac, by increasing the CU from 70 percent to 90 percent. The estimated irrigation uniformity effects on yield, quality, and gross re-ceipes are summerized in Table 1. Tu-ber quality data is based on the 1995 irrigation study depicted in Figure 1. The estimated increase in gross receipts firm increasing CU from 70 to 90 per-cent is \$144/acre. Smaller increases in CU would generate smaller increases in gross receipts. Tuber quality will likely be more variable when the irrigazion system has a low CU. The percentage of field area receiving deficit

system having a CU of 70 percent, but water application can be reduced by environment largely determine irrigationly 9 percent of the field would readditional irrigation, but overall procive less than 17 inches with a CU of duction will not increase because the

#### Field Scale Yield Distribution

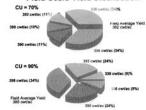


Figure 3. Comparison of estimated field scale potato yield for two levels of irrigation uniformity

Table 1. Estimated irrigation uniformity effects on yield, grade and gross receipts for Russer Burbank

Irrigation		Yield		Incentive		
Uniformity	Total cwt/scrr	U.S. No. 1's confucer	7 no 14 on certison	Adjusted Price \$/out	Gross Receipe \$/acm	
70%	162	277	138	4.74	1716	
90%	385	310	148	4.83	1860	
Difference	23	33	10	0.09	144	

Table 1. Estimated irrigation uniformity effects on yield, grade and gross receipts for Russet Burbank

Irrigation		Yield		Ince	ntive
Uniformity	Total cwt/acre	U.S. No. 1's cwt/acre	7 to 14 oz cwt/acre	Adjusted Price \$/cwt	Gross Receipts \$/acre
70%	362	277	138	4.74	1716
90%	385	310	148	4.83	1860
Difference	23	33	10	0.09	144





Estimated irrigation uniformity effects on yield, grade and gross receipts for Russet Burbank.





WATER APPLICATION SOLUTIONS





- Uniformity
- Throw distance
- •The right strategy for your site

## Sprinkler Selection









No one sprinkler package is right for all conditions. Look to Nelson for customized water application solutions.



























**D3000 - Germination** 



GREEN PLATE

D3000 Sprayhead Performance



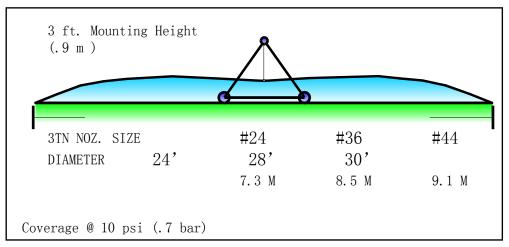
	Pressure			
Description	Range			
Concave	6 - 40 psi			
Fine Groove	.41 - 2.8 bar			

Nozzle Range 3TN #9-#50

GERMINATION IRRIGATION

Throw Distance Data





### **D3000 - Germination**







D3000 - Irrigation



BLUE PLATE

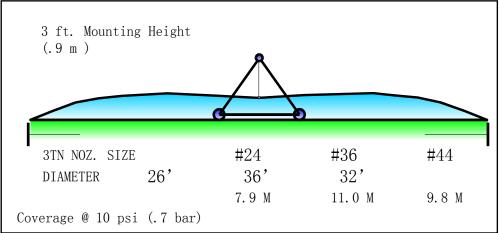
D3000 Sprayhead Performance



Description	Pressure Range	Nozzle Range
Concave	6 – 40 psi	3TN
Medium	.41 - 2.8 bar	#9-#50
Groove		

Throw Distance Data





## D3000 - Irrigation



## Multiple Trajectory Performance

- Reduce Stream Collision
- from Single Trajectory Streams
- Fills in the Pattern
- Wider Wetted Band
- Less Inventory

#### **Superior Windfighting**



#### **High Uniformity**



Performance through full nozzle range. (Shown #50 3TN)







#### **NELSON D3000 SPRAYHEAD**



Innovative Solution: Single Plate - Multiple Trajectories



- Greater Throw Distance
- Less Stream Collision
- Lower Instantaneous Application Rates
- Less Wind Drift

## NEW! MULTI-TRAJECTORY SPRAY PLATE TECHNOLOGY





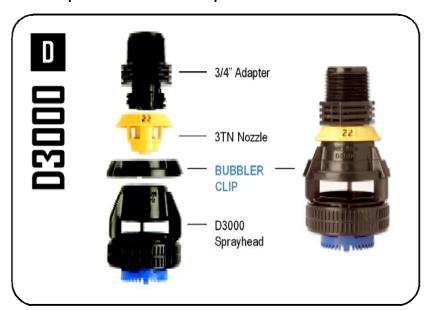
**D3000 – Special Applications** 



#### D3000 SPRAYHEAD WITH BUBBLER CLIP

Transform the D3000 into a LEPA Bubbler with a simple "Bubbler Clip" attachment.

**LEPA** 



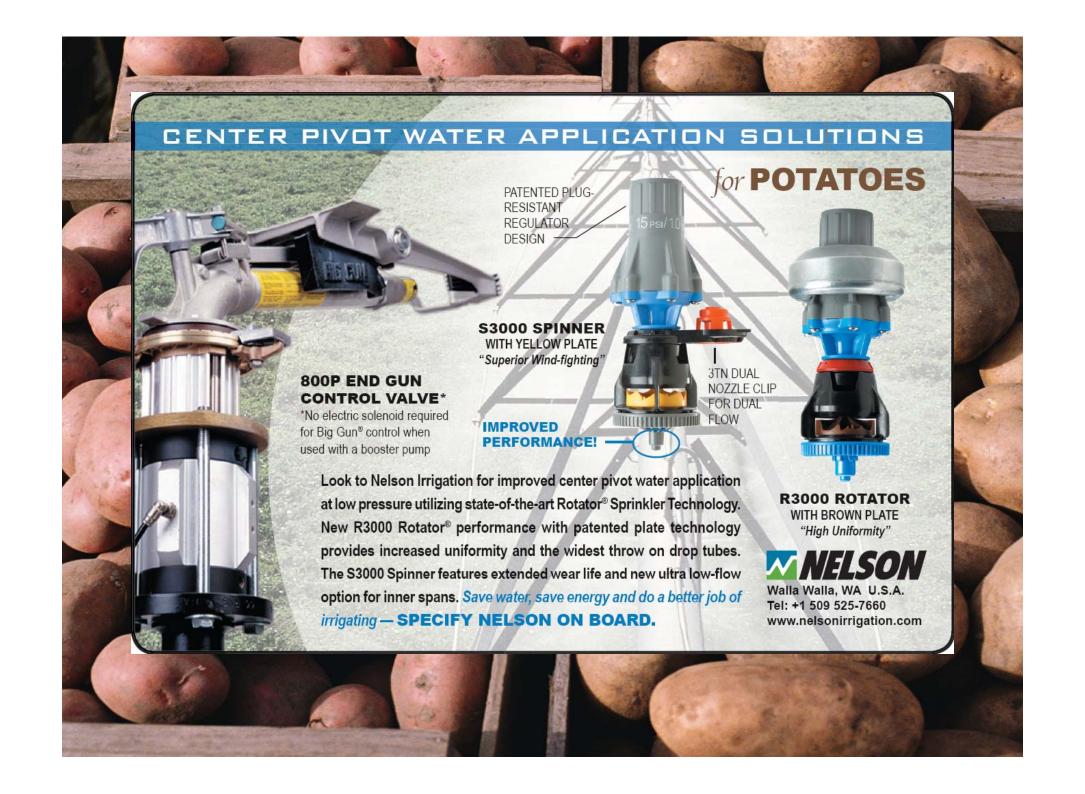




#### **HD3000 HOSE DRAG ADAPTER**

Utilize the ¾" Hose Drag Adapter on the 3000 Series to apply a hose drag or drag sock.

## D3000 – Special Applications





## R3000 ROTATOR®



- Mew plate designs for better performance at lower pressures
- Greatest throw distance on drops for the lowest application rates and reduced runoff
- ✓ High uniformity with high efficiency
- ✓ No special mounting assembly required



#### ADVANCED PLATE DESIGN

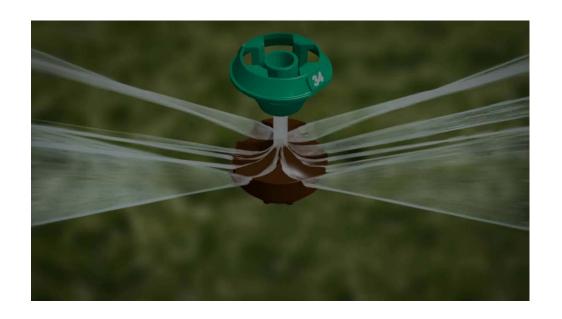




- Built-in Uniformity (Multiple Trajectories)
- Greater Throw Distance
- Lower Pressure Operation
- Lower Instantaneous Application Rates







**High Uniformity** 











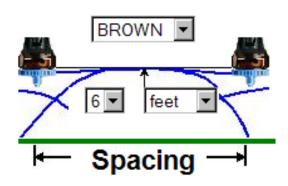
**High Uniformity** 







#### HIGHEST UNIFORMITY IN THE INDUSTRY



Uniformity values indicate the lowest predicted Christiansen's Uniformity, CU, at any spacing within the limits of the sprinkler. High values indicate that the product can be used with relative safety throughout the spacing range. Application of the product in conditions for which the tabulated values are lower may require additional analysis to determine the most advantageous spacing. Nelson Irrigation Corporation makes no representation regarding droplet conditions, uniformity, or application rate.

		Nozzle Size									
psi	14	16	18	20	24	28	32	36	40	44	50
15	90	90	95	95	95	95	95	95	95	95	95
20	90	90	95	95	95	95	95	95	95	95	95
25	90	95	95	95	95	95	95	95	95	95	95

P3000 voot 2007-03-27



- **✓** Superior uniformity at low pressure
- ✓ Gentle, rain-like droplets
- ✓ No special mounting assembly required







S3000 SPINNER "Windfighter"

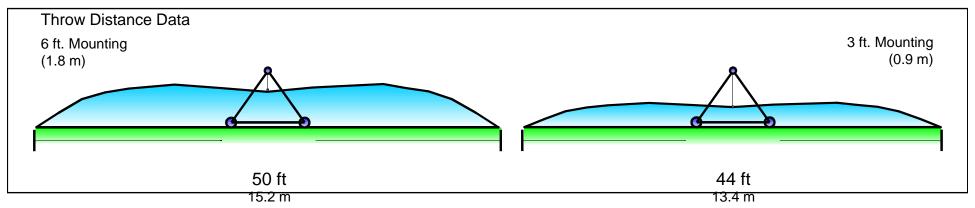


YELLOW



#### S3000 Spinner Performance

Mounting Position	Trajectory	Pressure Range	Nozzle Range
Drops	21°	10 - 20 psi .70 - 1.4 bar	3TN #12 - #50



Coverage @ 15 psi (1.0 bar) #36 3TN Nozzle.

S3000 SPINNER "Windfighter"





## S3000 SPINNER "Windfighter"



S3000 SPINNER "Windfighter"



- ✓ A new standard for in-canopy irrigation
- Maximize throw and minimize evaporation at low pressure
- ✓ No special mounting assembly required



**A3000 Accelerator Package** 



A3000 ACCELERATOR "Spray Head Replacement"









A3000 ACCELERATOR "Spray Head Replacement"

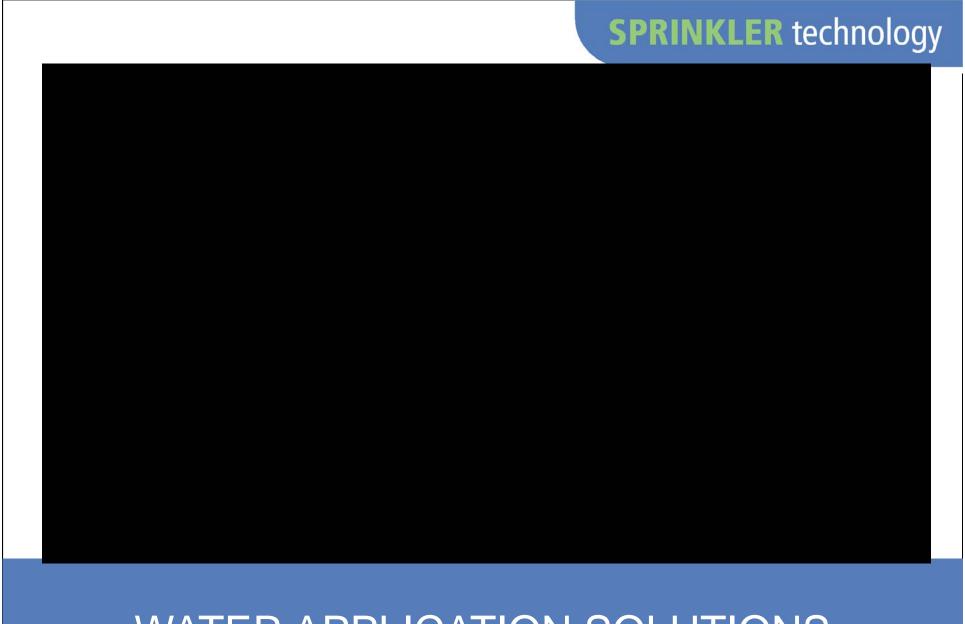


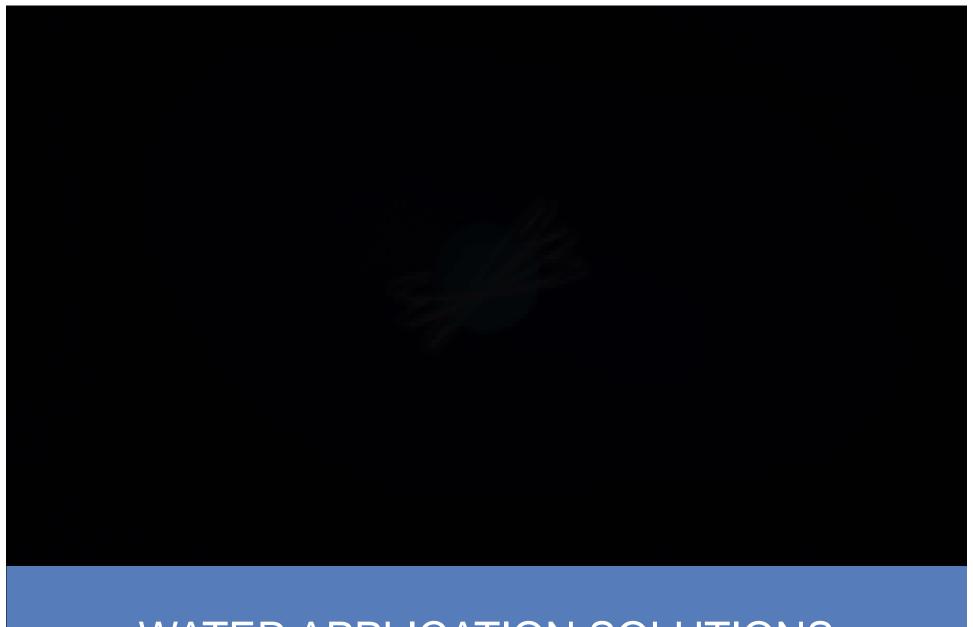


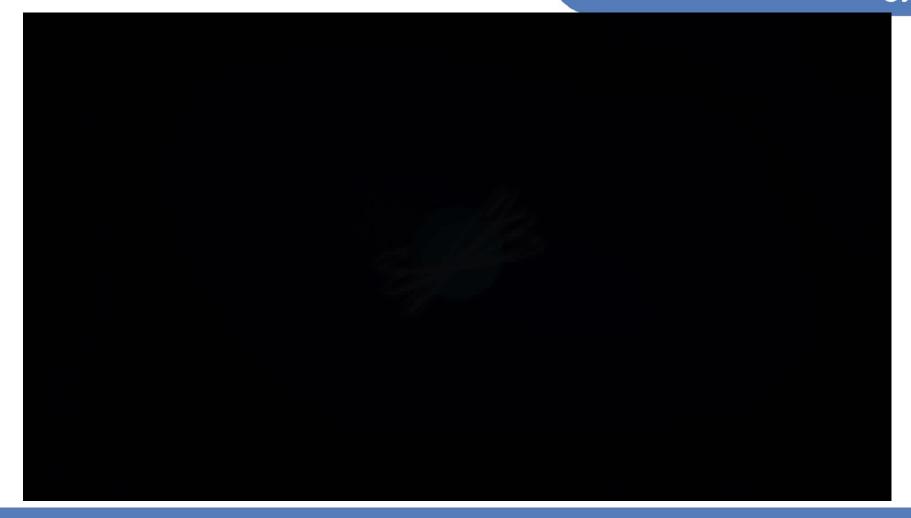




A3000 ACCELERATOR "Spray Head Replacement"











# MELSON