Table of contents

Introduction	Page 2
Initial soil sample Petty Full	Page 3
Initial soil sample Petty Half	Page 4
Twin N and liquid Fertilizer applied	Page 5
Petiole graph for Petty Full	Page 6
Petiole graph for Petty Half	Page 7
Infrared photo July 1, 2014	Page 8
Infrared photo August 6, 2014	Page 9
Crop vigor phot0 August 6, 2014	Page 10
Infrared photo August 21, 2014	Page 11
Crop vigor photo August 21, 2014	Page 12
Harvest and yield information and summary	.Page 13

Twin N test plot

Test year: 2014

Grower: Cloud 9 Farming, Fred Olberding

Crop: Ranger Potato, a processing type of Russet

Location: Franklin County, 4 miles north of Pasco, Washington

Field ID: Petty full, used as a check, and Petty half was treated

with two applications of Twin N

Data collected by:

Dennis Reisch, Reisch Company, Inc. Pasco, WA 509-366-9353

Introduction

The two fields identified as Petty Full, (check), and Petty half, (treated). They were side by side and had similar soil type and irrigation systems. The only difference between the fields is that the Petty half had never had potatoes grown on it. This is a slight problem because virgin ground can sometimes produce a larger yield. After emergence the two fields were sampled, both petiole and soil, on a weekly bases. That information was used to make weekly recommendations and water run applications of fertilizer. This approach is referred to as spoon feeding and is normal in this potato production area.

Fax 1-509-543-6939 Cell 1-509-366-9353

> eisch Company, Inc. PO Box 3756

					Boron, ppm		0.4					gram	e	oils	-		MIL)	arising																AND SECTION OF THE PROPERTY OF		
					Соррег, ррт		0.4					"Although care has been taken in developing this recommendation program	Dennis Reisch, Reisch Company, Inc. does not and cannot guarantee the	accuracy thereof because of the information entered generated by the Soils	a bandfor the method in which the sample was gathered. Anyone using	Lab and/or the method in which the sample was gathered. Anyone using	mapui oi	Dennis Reisch, Reisch Company, Inc., from any crop injury or damage arising			After	Preplant	69.85%	24.01%	3.17%	2.96%	%00.0									
	Tons	Tons	Tons	2	Manganese, ppm		2					mmenda	nnot gua	enerated	red An	deci. All	пеешеа	njury or			Ideal	Soil	65-75	15-20	3-8	₹	0									
Yield		35			mqq ,non,		10					this rec	ot and ca	entered	was nathe	d chall ho	suall be	any crop			Your	Soil	70.18%	24.12%	2.72%	2.98%	%00.0									
	Sacks	Sacks	Sacks	Sacks	Zinc, ppm		2.5					eveloping	c. does r	ormation	elames	adilible	I LISK and	c., from					%Ca	%Mg	%K	%Na	жн									-
Yield					mqq,nylus	=Mg ppm	8.8					aken in de	npany, In	of the infe	which the	thoir our	ING JIBUT	npany, In													Connector	0	9	9	2.5	
Variety	Norks	Ranger	Burbank	Shepody	Magnesium, meq/100gm		2.43					as been ta	eisch Cor	because	othod in v		oes so at	eisch Cor													Humitron Connector	0	0	0	•	
					Calcium, meq/100gm		7.07				ER:	h care h	Reisch, Ro	, thereof	or the m	or tile ill	mation d	Reisch, R	" esn us												8	2	•	0	0.18	
					Potassium, ppm	Ca ppm=	107				LEGAL DISCLAIMER:	"Althoug	Dennis F	accurac	puo de l	Lab and	tue intor	Dennis F	from such use												3	3	•	0	0.3	
					Phosphorus, ppm		17				LEGAL [-			acre											F	0	0	0	0.0	
The state of the state of	Section 1999		-		Mqq -M əftiti		24								dion	HOLL	-			pounds/acre											M	9	9.0	0	9.0	
US Ag					A \adl ,N oinsgrO		80			acre	acre		cre	cre	olonolo.	pints/acre/application	-			0											ž		-	0	0.0	
Bring Carlotte Carlotte	-				% 'W'C		-			pounds/acre	pounds/acre		quarts/acre	quarts/acre	ainto/oc	pints/ac		JS		Sulfur=	ire										Mg	0	0	0	0	
Laboratory:	Total Acres:				% əmid saəəx		0			0	0	2	2			-		Recommendations		0 Elemental Sulfur=	0 pounds/acre							ations			S	0	0	0	0	
					DEC meq/100gm	•	10.07					[and/or]						Recomn		0	0							mmend	SS04	63.6	s	30	5	19	0	
					mg00f\psm sk	•	0.3										-	ancing		Gyp=	MgS04		Note:					ur Reco	K20	375.2	K20	251	0	124	8	
Farming	999				mahos/cm	amor eN	0.45	ndatione	Cario	ORI		r Fertilize				ations		rient Bal		0	0							fate Sulf	P205	182	P20s	82	9	0	4	
Cloud "9" F	Petty Full-156		-		Hq lioi	5	7.6	- mmos		.0G	50G	id Starte	-			ar Applic		licro Nui		Lime =	K-Mag	0	0	12		2		and Sult	z	225	z	0	36	189	0	
Customer:							Soil Analysis Results::	Organic Acide Becommendations	Organic Acids Ne	Preplant Humitron 50G,	Top Dress Humitron 50G	Connector with Liquid Starter Fertilizer	First Irrination	Connector Water run	Collifector water in	Connector with Foliar Applications		Secondary and Micro Nurient Balancing		Calcium =	Magnesium	Zinc	Iron	Manganese	Copper	Boron		Primary Nutrient and Sulfate Sulfur Recommendations			The state of the s	Preplant	Starter	Waterrun	Foliar	

Fax 1-509-543-6939 Cell 1-509-366-9353

Reisch Company, Inc. PO Box 3756 Pasco, WA 99302

					Boron, ppm	3	0.3					Iram		slio		n ie		Bulle	-										-			T	-				
					Sopper, ppm)	0.5					"Although care has been taken in developing this recommendation program	Dennis Reisch. Reisch Company, Inc. does not and cannot quarantee the	accuracy thereof because of the information entered generated by the Soils	ab and/or the method in which the sample was gathered. Appropriation	the information does so at their own risk and shall be deemed to indemnify	Dennis Beisch Beisch Company Inc. from any groon injury or domestic parieties	dalliage		After	Preplant	67.40%	21.61%	8.42%	2.57%	%00.0						Ī	Ī				1
	Tons	Tons	Tons		Manganese, ppm	•	-					mmenda	nnot aua	Jenerated	Tad An	deemed		o Kinin		Ideal	Soil	65-75	15-20	3-8	۲	0											
Yield		32			ron, ppm		7					this rec	ot and ca	entered	vac gathe	shall he	2000	111		Your	Soil	68.25%	21.88%	7.26%	2.60%	%00.0			1		Ī	T	Ī				
	Sacks	Sacks	Sacks	Sacks	Zinc, ppm		1.3			-		veloping	c. does n	rmation	samula v	risk and	- from	5				%Ca	%Mg	%K	%Na	Н%					Ī	T					-
Yield					sulfur,ppm	=Manner	8				-	iken in de	npany. In	of the infe	which the	their owr	al vacan	, , , , , , , , , , , , , , , , , , ,											-		Connector	0	40	0	2.5		-
Variety	Norks	Kanger	Burbank	Shepody	Magnesium, meq/100gm		1.68				-	is been ta	sisch Cor	because	thod in v	Des so at	o dosie														Himitron Connector	0	0	0	0		
					Calcium, meq/100gm		5.24				ER:	h care ha	eisch. Re	thereof	or the me	mation de	olech De	h use."													α	2 0	0	0	0.21		-
					Potassium, ppm	Ca ppm=	218				LEGAL DISCLAIMER:	"Althoug	Dennis F	accuracy	bab and/	the infor	Dannie	from such use											-		ā	5 %	0	0	0.3		
			-		Рһоѕрһогиѕ, ррт		10			-	LEGAL		-						acre										-		E.	9	0	0	9.0		
					Mitrate N- ppm		12								tion				pounds/acre												Ž	00	0.5	0	9.0		
US Ag		-	the same and same same same same		Organic N, Ibs/ A		D.		-	acre	acre		cre	cre	pints/acre/application				0								-				Zu	0	+	0	0.6		- Committee of the comm
	-	-			% 'W'О		0.5			pounds/acre	pounds/acre		quarts/acre	quarts/acre	pints/ac		St		Sulfur=	Je.											Ma	0	0	0	0		
Laboratory:	Total Acres:		-		Ехсеss Lime %		0	-	And the Party of Street or	0	0	2	2	0	-		nendation		0 Elemental Sulfur=	0 pounds/acre							ations				5	0	0	0	0		
					CEC med/100gm		7.68					[and/or]					Recom		0	0							mmend	000	200	18	s,	\$	15	23	0		-
			-		Na meq/100gm		0.2					e.					lancing	D	0 Gyp=	0 MgSO4		Note:					fur Reco	K30	200	8.817	KZO	147	0	73	4		The second secon
Cloud "9" Farming					Salts, mmhos/cm	Na ppm=	0.34	ndation		[OR]		r Fertiliza			ations		rient Ba		0	0						100	fate Sul	9000	200	097	P20s	180	100	•	9		
Cloud "9"	Petty Half				Hq lio2		7.5	comme		.0G	50G	id Starte		-	ar Applic	The state of the s	icro Nu		Lime =	K-Mag	2	12	16	3	2		and Sul	Z		9/7	z	=	36	229	0	-	Section of Consessions
Challe Control and	riela ID:		ACCOUNT AND ADDRESS OF A STATE OF	The state of the s			Soil Analysis Results::	Organic Acids Recommendations	NET FEMALES AT LANGUAGES AND	Preplant Humitron 50G,	Top Dress Humitron 50G	Connector with Liquid Starter Fertilizer	First Irrigation	Connector Water run	Connector with Foliar Applications		Secondary and Micro Nurient Balancing Recommendations	A CONTRACTOR OF THE PARTY OF TH	Calcium =	Magnesium	Zinc	Iron	Manganese	Copper	Boron	And the control of the second control of the	Primary Nutrient and Sulfate Sulfur Recommendations		and the second contract of the	The state of the s		Preplant	Starter	Waterrun	Foliar		

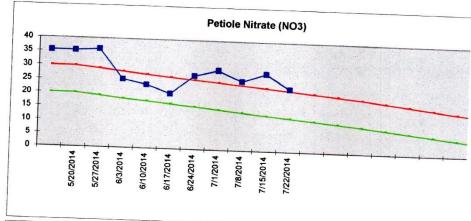
Applications of water run fertilizer started May 9, 2014 and continued through July 16, 2014. Following are dates and amounts delivered plus the dates of the Twin N applications. The amount listed below were delivered on the corresponding dates, and were applied during the next seven day period. It was not necessarily applied on the date of delivery. The Twin N was applied on the date listed.

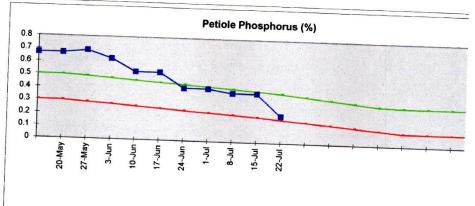
Date	Petty Half	Petty Full
May 9	17.3 lbs/acre of N	20.7 lbs/acre of N
May 22	40.3 lbs/acre of N	60.9 lbs/acre of N
May 22	Twin N	
June 3		23.4 lbs/acre of N
June 6	Twin N	
June 10	28.9 lbs/acre of N	33.0 lbs/acre of N
June 18	36.0 lbs/acre of N	15.3 lbs/acre of N
June 25	5.6 lbs/acre of N	24.7 lbs/acre of N
July 2	24.3 lbs/acre of N	25.2 lbs/acre of N
July 9		26.8 lbs/acre of N
July 16	12.11 lbs/acre of N	16.3 lbs/acre of N
TOTALS	164.51lbs/acre of N	246.3lbs/acre of N

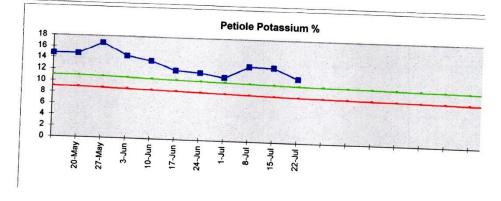
The Petty Half, (Treated), used 81.79 pounds/acre less Nitrogen than the Petty Full, (Check)



Petty Full



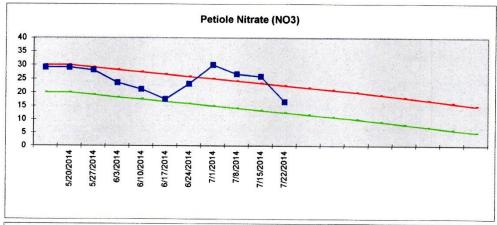


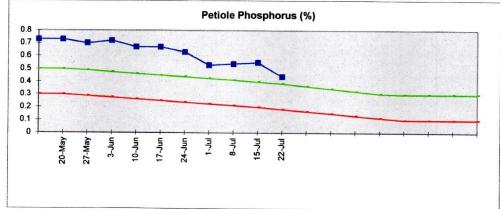


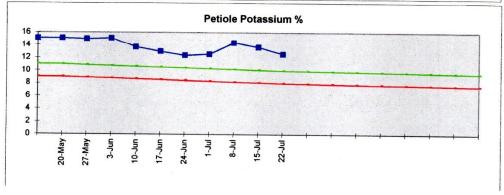
Reisch Company, Inc



Petty 1/2

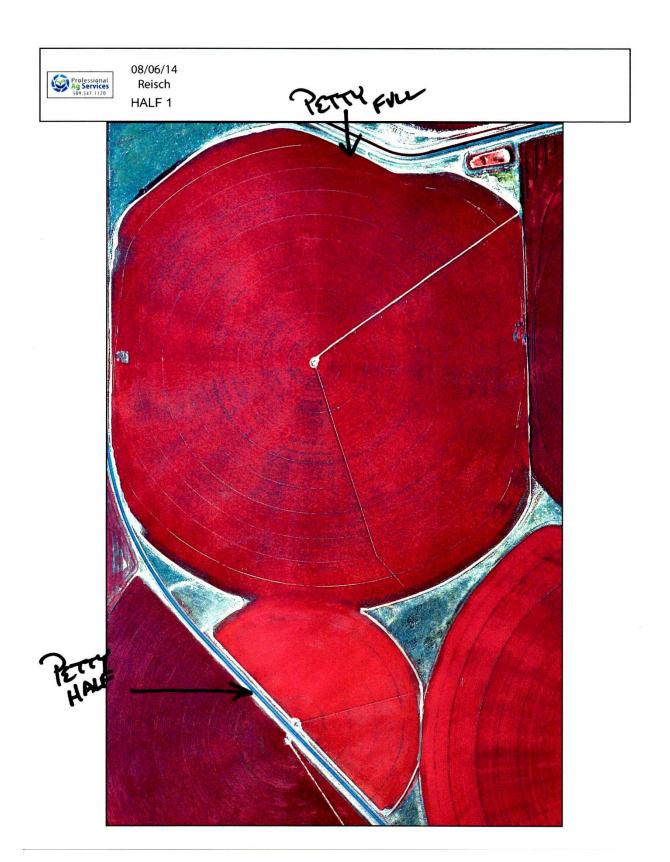


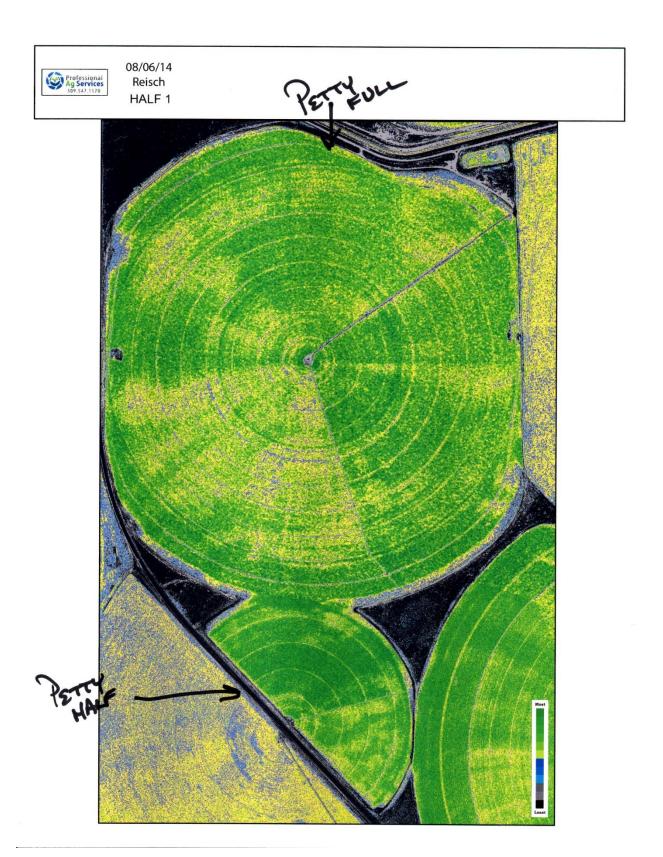


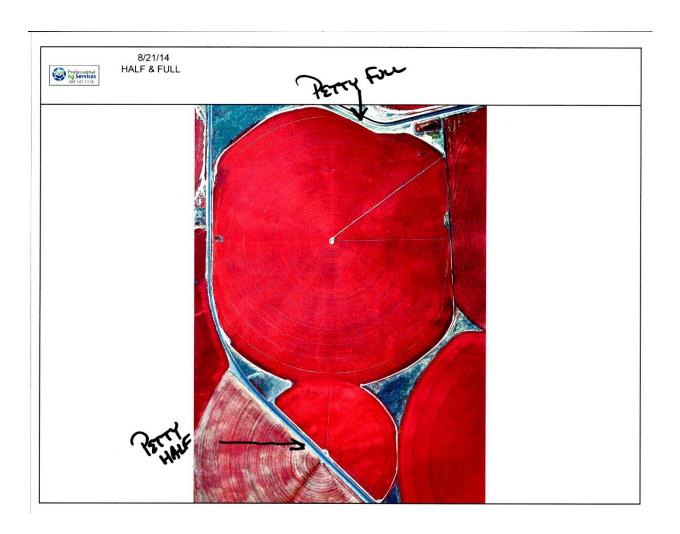


Reisch Company, Inc











Yield data

The harvest started around September 1, 2014. The two fields were harvested together rather than separately. Yield data was obtained by measuring the distance traveled to fill the trucks. This was done randomly throughout both fields. The total tons delivered to the processor was 7283.7589 tons and yields were calculated by using the measurements retrieved during the harvest. The yields are shown below:

Petty Full (check) yield was 40.7346 tons or 814.692 sacks per acre

Petty Half (treated) yield was 42.2346 tons or 844.692 sacks per acre.

The difference is a 3.55% increase.

Summary

When we calculate the total amount of fertilizer, preplant, starter, and water run, 16.75% less Nitrogen was used. On top of that we increased yields by 3.55%. Some of this could be explained by the fact that the Petty Half field had never had a crop of potatoes before, but I feel the Twin N applications saved at least 50 pounds of Nitrogen per acre.

I will be recommending **Twin N** to my customers for the 2015 potato crop.