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Dalrymple Farm Inc.

Short Straw and Compost Advantages in Vineyards

SARE project FNE01-366

Northeast Region SARE
Sustainable Agriculture Research & Education Program

Short Straw and Compost Advantages in Vineyards

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Project Goals

My project was to address how to best increase organic matter in vineyards. To find an economical way to apply chopped or short straw and compost to vineyards, resulting in increased organic matter. The end results of such a program will be better water and fertilizer retention, less soil erosion and better weed suppression. As organic matter reaches adequate levels, there will be less need for fertilizers and herbicides. Also as a result there will be more vigorous grapevines that will produce a larger and more stable crop.
What I have done is a test that applies compost under the trellis and chopped straw to the middle of the row, allow it to breakdown and then work it in to the soil. After repeating the process we should start to see some results in the second season.
Although this is a slow process of building organic matter in the soil, it will take many years to see the full benefits of such a program.

Update to our farm operation

Since I received this grant many things have changed on our farm:

1. My father decided to retire and sell the farm (of 750 acres of which 320 acres are vineyards) to my brother, sister and myself. In doing so, we have formed a corporation. I took over as the operator of the farm and have to handle all the business affairs, along with the help from my brother (who is full time) and my sister (who is a part-time bookkeeper).

2. We added 55 acres of land to the Ovid farm and planted 15 acres of grapes (Rieslings).

3. While in the process of transfering ownership, my father developed cancer and began treatments but to no avail. He passed away at the end of October 2002.

4. We are still buying the farm from his estate and continuing with this project.

Who were my cooperators

There are many people that helped with advice on this project, but the main 3 people involved are:

1. Tim Martinson - Cornell Coop. Ext. - Tim has been a big help setting up a test plot as well as taking the soil and petiole tests.

2. Gregg Bodine – Phelps Supply – Gregg has been a great help with the fertilizer and compost needs. As well as locating a source of mushroom soil to start making some compost for this project.

3. George Leidig – Autrusa – George has been a great source of knowledge about compost.

The project

This project turned out to be a lot more than I had anticipated. But it has been a very good learning experience. I greatly under estimated all of the costs of the materials and the equipment, as well as the time involved. The compost is somewhat available for a price but the amount that I needed far exceeded my budget. Some of the equipment I had already acquired and other pieces took more time to build than I had planned. But to break it down there were basically 4 steps that had to be accomplished.

1. Test Plot:

   a. Layout – Tim and I laid out 4 different treatments to be repeated 5 times – a map is enclosed of the test plot.

   b. Soil test – 20 soil samples were taken for the initial baseline of the project. Samples were taken both under the trellis and in the middle of the row. Both surface and subsoil samples were taken. Results are available at your request. I did not include them with this report because they are only the baseline results.

2. Material:

   a. Round Bales – I decided to buy a round baler for this project instead of just buying the round bales, because of the number of bales that would be needed for this project, as well as to account for the many years this project will be going on for. Our farm already has fields that I can cut for use, therefore; all I have to do is truck the bales to the test plot.

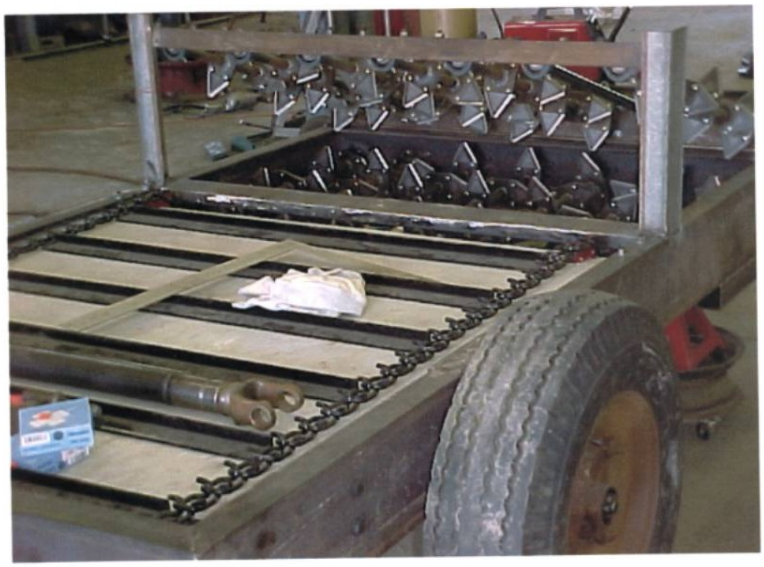
   b. Compost - This turned out to be harder to find in this area that I had anticipated. This trend is changing more everyday and in the future should become more economically available. For now though we are making our own. I am using a mushroom soil (peat moss – straw – horse manure) as a base and I am adding other material to make my own compost.

3. Machines:

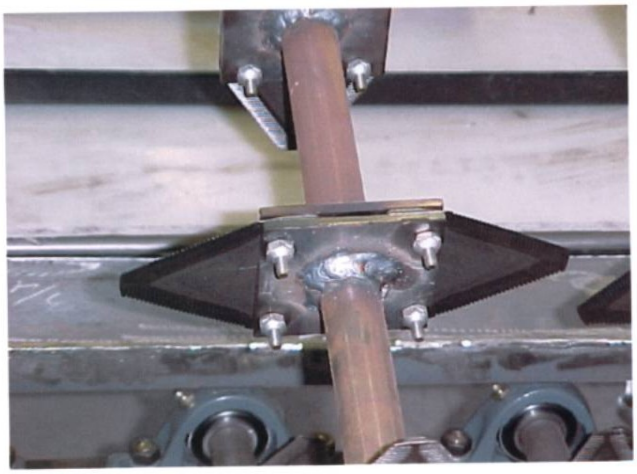
   a. Compost applicator – For this process I got a Mill Creek Row Mulcher. This machine works well for applying material under the trellis. It has the capacity to hold 7cu.yd. of material, which in this case would be compost. It has a side discharge for putting the material under the trellis, in a narrow band (about 36').

   b. Straw Chopper – This is the part of the project that required the most work. I had to design and build this machine from scratch. I needed a machine that would handle a large round bale – unroll it – chop it – drop the chopped straw into the middle of the row.

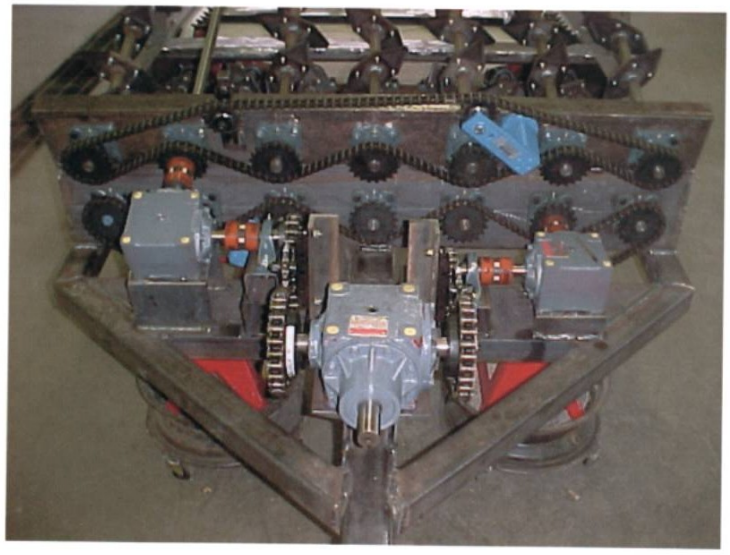
I started with a compact frame that would fit into the tight rows of the vineyard, no wider than 6'. Then I had to build a way to unroll the round bale. I chose to use the chain of a manure spreader. I had to find one that was narrow enough to fit into this tight space. I also had to build a drive that would work independent of the chopping head. This way I could put the chopped straw only where it was needed. In some areas where the organic matter is already high or the soil is deep there is no need to apply mulch. Also I wanted the most friction free bed that I could find to ease the unrolling and reduce wear. For this I used a plastic bed used in trucks to make the load slide out without resistance. The bed also needed to be tipped toward the back of the machine to help the bale unroll as well as to keep the whole bale from trying to roll in to the chopper.



Next was the chopper. I wanted to keep as many of the parts for this machine as I could stock items. So the machine could be built with over the counter parts. For the chopper I decided to use common sickle bar knifes. These are available in many different styles and sizes. I ran one set of shafts flat and the other on an angle so that as the straw feeds farther into the machine it would chop the entire mat from the round bale.



Next was the drive for the chopping unit. What was important here is that I wanted the straw chopped and distributed evenly. I thought that the best way to run the chopping unit was to run it off the tractor's PTO. By doing this I could run it at different speeds for finer or coarser chopping. In building the drive mechanism I had to determine how fast the blades had to turn and in what direction. I chose to run them at 2,100 rpm's and to make the shafts turn in opposite directions. This was all accomplished with the use of gears, chains and gearboxes all connected to the tractor with a PTO shaft.



What I did here was to come from the tractor's PTO with a shaft turning at 540 rpms and go into a 1 to 2 gear box that splits it 2 ways. Then out of the gear box with a 26-tooth sprocket to a 13-tooth sprocket to again double the PTO speed. By weaving the chain over and under the sprockets for the chopper shafts it makes them work in opposite directions so the blades work against each other to chop the straw.

Now all that had to be done is frame everything in and run the hydraulics to operate the table chain. I also added a flow control to the hydraulic system so I could adjust the table chain speed (how fast the straw would feed into the chopper). This way I could match the speed that the straw would feed to the speed in which the tractor is traveling.

After a paint job its time to cross my fingers and try it out. There were a few modifications that had to be made but for the most part it is built.

4. Application:

    a. Applying the compost – with the Mill Creek wagon a layer of compost is applied to the hill under the trellis. I used a 2" to 4" layer at a width of 36".

    b. Applying the chopped straw - with the straw chopper I apply a 4" to 6" layer of chopped straw to the middle of the vineyard row. Once the straw has set for a while it will settle down to about 3" to 4".

Findings and accomplishments

Although I am behind on my original schedule I am convinced that this project will prove to be a very beneficial plan for all growers. I am continuing to work with Tim Martinson to find a more economical source of compost. But I do plan to continue with the compost that I am making in the spring and am checking out new sources every week.

1. Compost – a cost-effective cheap source of good compost is not yet readily available in this area at this time. Although there are many that are starting to get in to it. I also found that there is quite a bit of education that is needed by some of the people that are starting to make compost. Some think that if you just put a bunch of old manure in a pile it is compost. There needs to be nutritional test taken on any source of compost that you plan on using. The different sources of just manure that is in it can make a great deal of difference of how much if any should be applied. I am confident that in the near future this shortage will start to decline.

2. Straw – there are many sources of round bales in this area, but the bales need to be checked as to when they were baled. Care should be taken when they are cut as to not bring any more weeds seeds into the vineyards than necessary. This is why I chose to make my own. Also by making my own, I can control how thick the mat is in the round bale.

3. Machines – the Mill Creek wagon is proving to be a very useful tool for the farm as it is not only used for applying compost but it also can be used to apply lime in the vineyards. The straw chopper although quite the project to build; has shown that there is now an economical way to apply chopped straw in the vineyards. The next design of this machine may have a different chopping head in it to help in chopping straw in less than good condition. Some of the round bales that are being made on some farms have very coarse material in them with very thick mat. I am also using a device called a spading machine, it is much like a big rototiller with the exception it uses spades instead of tines like a rototiller. The reason for the spades instead of the tines is much like a shovel as it does not compact the soil at the bottom of the stroke. A rototiller can actually compact the soil under which it is digging, where the spader has a very narrow edge and will not compact the soil under where it's digging. This will speed the process of incorporating the organic matter into the ground. Also by using the spader, I can get the organic matter deeper into the soil where it will be more readily available to the roots of the vines.

4. One unexpected result from this project is that the financial as well as some of the physical help that was promised to me by some interested parties had never

happened. This resulted in a slower than expected progress on this project. There were many times that I could not proceed with this project until I raised more money. In the future should I try another project of this size, I will get all agreement in writing.

Site conditions

The vineyard that this test is being conducted in is a very clean site. There are some weeds but for the most part is a well maintained vineyard. There are some weak spots and some very different soil conditions throughout the site, which will be very interesting to see if I can balance out the vineyard. This site has always been clean cultivated so the top of the surface is already loose. A vineyard that has not been disced or has grass growing in the row middle or has a lot of weeds growing under the trellis will not have the same results that I have. On some years when the weather is dry, you may choose to apply more chopped straw to help with water retention. In some vineyards, they may need more or less compost under the trellis depending on not only the soil conditions but also the farms financial conditions.

Economic findings

The long term economic results are yet to be determined. This project will take many years to show the long-term benefits of such a program. But there are some things to be taken into consideration before starting this program:

1. Condition of vineyard - my vineyard was already clean and the soil was already loose which saved me a lot of time and expense to start with. Thus not having to breakup the soil so the organic matter can be worked into the root zone.

2. Costs of materials- round bales are fairly cheap although quite a few are needed. Most farms can find them near by if they do not make their own. Compost on the other hand can get to be quite expensive. You should be careful of what you are getting. Is it really compost or just old manure (compost does not smell – if it smells it is not compost yet)?

3. Testing – This can run into a lot of expense as well as time, but it needs to be done. You have to know what you have in the ground already, as well as what is in the vine. You should also test the compost for it's nutritional value. There will be some fertilizer added to make up for what the straw and compost are going to use as they breakdown. This is why testing is so important. In the future as the organic matter increases in the soil the amount of fertilizer that is needed should decrease to the point that more than makes up for the extra amount that was added in the beginning.

4. Machines – the machines that I used cost a lot of money to start with but how they did the job more than made up for their cost. And the increase in production should more than pay for them. Also some of the machines (Mill Creek wagon) have other jobs that it can be used for.

New Ideas that were generated from this project

Probably the biggest new idea that I got out of this project is that I will start to make all my own compost for my vineyards. Working with area farmers, wineries and using materials that I have already at hand, I will start to generate as much compost as I need for our farm. Making compost does require a lot of work as well space, some farms just don't have the room. It also requires equipment to work the compost with. Compost has to be mixed and turned on a regular basis. I have equipment and space for this.

Future of this project

I do plan on expanding this project to other vineyards on my farm. In the near future I hope to be able to rotate from block to block by either doing alternating rows or whole sections at a time. What I need to do is produce the best even crop I can. Many wineries have to deal with, what is called non-typical aging. This can come from the fact that grapes in one part of the vineyard are not at the same ripeness as other. By using this program I hope to balance out the whole vineyard. Also, it should help to reduce the up and down cycles that plants have, especially after a big crop year when the plants own defenses cuts its production back so it can build up it reserves.

Outreach Program

I have not had any field meetings yet for this project. Tim and I are still documenting the results for future meetings. At this point, there are not any results for people to see. But when the plants start to respond and we have collected the data we will have a field meeting and the results will be published in the newsletter as well as a talk will be given at the annual convention.

Summary

Even though this project is being wrapped up, this phase will never end. It will continue as a research project for many years to come. This has been a long time in coming. This has been a learning experience that I will never forget. I have learned more about not only this project but also about the whole process of grants, matching funds and other parts of the process to numerous to mention.

I would like to take this time to thank all of the people who have made this project possible.

Thanks to Tim Martinson, without his help, alot of the data would not be possible as well as his guidance in this whole process. Also, for his support and drive to keep this project moving forward.

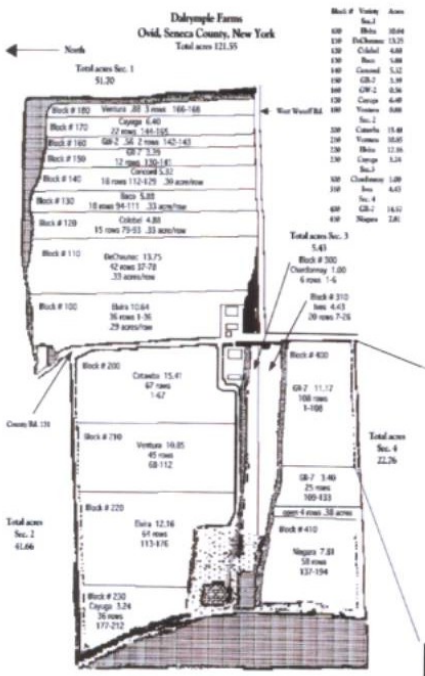
Thanks To Gregg Bodine for all of his help with the fertilizer requirements and his help finding a local source of mushroom soil. Without that I would have had to truck it up from lower PA.

Thanks to George Leidig for teaching me about compost and building organic matter in soil.

And most of all thanks to everyone at the University of Vemont and The Northeast SARE Grant Program for all of the support and funding that you have given me. Thank you for extending my contract so I could complete this project. Without your support, none of this would have been possible.

William A. Dalrymple February 28 2003 SARE project FNE01-336

Test plot Diagram



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Compost and Chopped Mulch Test

GR-7

Plot Diagram

Treatments

1- Red - Compost

2- Orange - Mulch

3- White - Compost + Mulch

4- Pink - Nothing

Rep 1	Row 1-5	Red	1
	Row 6-10	White	3
	Row 11-15	Pink	4
	Row 16-20	Orange	2
Rep 2	Row 21-25	White	3
	Row 26-30	Orange	2
	Row 31-35	Pink	4
	Row 36-40	Red	1
Rep 3	Row 41-45	Pink	4
	Row 46-50	Red	1
	Row 51-55	Orange	2
	Row 56-60	White	3
Rep 4	Row 61-65	Red	1
	Row 66-70	Orange	2
	Row 71-75	White	3
	Row 76-80	Pink	4
Rep 5	Row 81-85	Orange	2
	Row 86-90	Pink	4
	Row 91-95	Red	1
	Row 96-100	White	3

Parts and labor breakdown

Parts

Company	invoice #	Date	Parts	Quanity	Price	Tax	Total	Miles	rate	total
Farm & Country	293602	2/27/01	3/16X3X3	2	$8.99	$1.26	$19.24	95.70	$0.325	$31.10
Chase Pitkin	92614	3/11/01	steel	1	$38.97	$2.73	$41.70	96.50	$0.325	$31.36
Chase Pitkin	125303	3/24/01	3/16x3x3	2	$10.99	$1.54	$23.52	96.50	$0.325	$31.36
			1" round	2	$16.99	$2.38	$36.36			
Farm & Country	52320456012	4/28/01	Knife	2	$6.49	$0.91	$13.89	95.70	$0.325	$31.10
Chase Pitkin	135458	4/28/01	1" round	2	$16.99	$2.38	$36.36	96.50	$0.325	$31.36
Farm & Country	96190456014	5/26/01	Bearings	2	$20.48	$2.87	$43.83	95.70	$0.325	$31.10
Benedict Mach.	4501	5/24/01	Mach. Work	1	$526.50	$0.00	$526.50	82.60	$0.325	$26.85
Lowe's	S0530JD1	6/13/01	2" rub Hvy	8	$5.48	$3.07	$46.91	98.40	$0.325	$31.98
I D Booth	491201	6/13/01	8" channel	1	$36.73	$0.00	$36.73	11.50	$0.325	$3.74
Applied Indust. Tech	30699	6/13/01	Bearings	14	$26.23	$0.00	$367.22	10.90	$0.325	$3.54
Applied Indust. Tech	30762	6/26/01	Bearings	4	$30.07	$0.00	$120.28	97.40	$0.325	$31.66
			Bearings	7	$31.37	$0.00	$219.59			
Fastenal	NYELM11461	6/26/01	nuts & bolts	1	$19.76	$0.00	$19.76	114.60	$0.325	$37.25
Applied Indust. Tech		6/28/01	Bearings	2	$27.75	$0.00	$55.50	97.40	$0.325	$31.66
			Bearings	2	$50.00	$0.00	$100.00			
			Fram	2	$68.00	$0.00	$136.00			
Wright	207949	7/25/01	PTO shaft	1	$200.85	$0.00	$200.85	32.70	$0.345	$11.28
Farm & Country	46440456012	7/26/01	Yoke	1	$34.99	$0.00	$34.99	95.70	$0.345	$33.02
Chase Pitkin	153648	9/16/01	1/8X1"	1	$12.88	$0.90	$13.78	96.50	$0.345	$33.29
Chase Pitkin	140322	7/14/01	1/8x2"	3	$10.69	$2.24	$34.31	96.50	$0.345	$33.29
			steel	1	$11.99	$0.84	$12.83			
Applied Indust. Tech	30991	8/2/01	gear box	2	$294.83	$0.00	$589.66	97.40	$0.345	$33.60
			gear box	1	$438.92	$0.00	$438.92			
			Sprockets	7	$14.11	$0.00	$98.77			
Applied Indust. Tech	31021	8/10/01	Sprockets	7	$10.94	$0.00	$76.58	97.40	$0.345	$33.60
			Couplers	8	$7.37	$0.00	$58.96			
			Couplers	4	$10.76	$0.00	$43.04			
			Sprockets	2	$24.33	$0.00	$48.66			
			roller chain	20	$3.61	$0.00	$72.20			
			Shipping	1	$5.00	$0.00	$5.00			
Applied Indust. Tech	31043	8/15/01	Sprockets	4	$19.65	$0.00	$78.60	97.40	$0.345	$33.60
			Sprockets	2	$22.08	$0.00	$44.16			
			Sprockets	3	$12.29	$0.00	$36.87			
			Bearings	4	$30.07	$0.00	$120.28			
			Sprockets	2	$62.09	$0.00	$124.18			
Applied Indust. Tech	34331075	8/22/01	Sprockets	1	$12.29	$0.00	$12.29	97.40	$0.345	$33.60
Chase Pitkin	161244	8/25/01	steel	1	$14.99	$1.05	$16.04	96.50	$0.345	$33.29
			steel	1	$1.99	$0.14	$2.13			
			3/16x3	2	$8.19	$1.15	$17.53			
			Hinge	1	$11.99	$0.84	$12.83			
			1/8x2"	2	$10.69	$1.50	$22.88			
			1/8x1"	2	$5.29	$0.74	$11.32			
			1/8x1"	2	$6.89	$0.96	$14.74			
Napa	104396	10/29/01	keyway	1	$4.17	$0.00	$4.17	48.80	$0.345	$16.84
Napa	104756	11/1/01	screw-wash.	1	$60.90	$0.00	$60.90	48.80	$0.345	$16.84
Chase Pitkin	135511	12/26/01	1/8" channel	6	$7.19	$3.02	$46.16	96.50	$0.345	$33.29

Parts continued

Applied Indust. Tech	34331484	1/4/02	Bearings	2	$36.13	$0.00	$72.26	97.40	$0.345	$33.60
			Bearings	2	$39.11	$0.00	$78.22			
			Sheave	2	$16.31	$0.00	$32.62			
			Sheave	2	$16.93	$0.00	$33.86			
			Bushing	2	$5.35	$0.00	$10.70			
			Sprockets	1	$8.11	$0.00	$8.11			
Dalrymple Farms		11/19/01	round bails	200	$25.00	$0.00	$5,000.00	140.00	$0.345	$48.30
Cooperative Extension		12/14/01	mileage	300	$0.31	$0.00	$93.00			
			petiole	5	$19.00	$0.00	$95.00			
			soil	20	$13.00	$0.00	$260.00			
Dalrymple Farms		1/1/01	Compost wag.	1	$500.00	$0.00	$500.00	20.00	$0.345	$6.90
Sensenigs Landscaping		8/7/02	mush. Soil	1	$778.96	$0.00	$778.96	173.40	$0.345	$59.82
						Total	$12,007.97	2521.80		$848.23

Labor

Week Ending	Name	Hr.	Rate/Hr.	total	Week Ending	Name	Hr.	Rate/Hr.	total
3/3/01	Bill	16	$14.00	$224.00	11/3/01	Bill	40	$14.00	$560.00
5/12/01	Bill	8	$14.00	$112.00	11/10/01	Bill	32	$14.00	$448.00
5/26/01	Bill	16	$14.00	$224.00	11/17/01	Bill	56	$14.00	$784.00
6/2/01	Bill	16	$14.00	$224.00	11/24/01	Bill	48	$14.00	$672.00
6/9/01	Bill	16	$14.00	$224.00	12/1/01	Bill	48	$14.00	$672.00
6/16/01	Bill	48	$14.00	$672.00	12/8/01	Bill	24	$14.00	$336.00
6/23/01	Bill	28	$14.00	$392.00	12/15/01	Bill	56	$14.00	$784.00
6/30/01	Bill	52	$14.00	$728.00	12/22/01	Bill	40	$14.00	$560.00
7/7/01	Bill	60	$14.00	$840.00	12/29/01	Bill	40	$14.00	$560.00
7/14/01	Bill	52	$14.00	$728.00	1/5/02	Bill	34	$14.50	$493.00
7/21/01	Bill	40	$14.00	$560.00	1/12/02	Bill	24	$14.50	$348.00
7/28/01	Bill	56	$14.00	$784.00	1/19/02	Bill	14	$14.50	$203.00
8/4/01	Bill	56	$14.00	$784.00	1/26/02	Bill	26	$14.50	$377.00
8/11/01	Bill	48	$14.00	$672.00	2/2/02	Bill	36	$14.50	$522.00
8/18/01	Bill	56	$14.00	$784.00	2/9/02	Bill	16	$14.50	$232.00
8/25/01	Bill	56	$14.00	$784.00	5/3/02	Bill	22	$14.50	$319.00
9/1/01	Bill	40	$14.00	$560.00	5/10/02	Bill	28	$14.50	$406.00
9/8/01	Bill	24	$14.00	$336.00	5/17/02	Bill	18	$14.50	$261.00
9/15/01	Bill	16	$14.00	$224.00	5/22/02	Bill	6	$14.50	$87.00
9/22/01	Bill	40	$14.00	$560.00	5/31/02	Bill	24	$14.50	$348.00
9/29/01	Bill	24	$14.00	$336.00	6/4/02	Bill	4	$14.50	$58.00
10/6/01	Bill	40	$14.00	$560.00	7/4/02	Bill	8	$14.50	$116.00
10/13/01	Bill	56	$14.00	$784.00	8/2/02	Bill	30	$14.50	$435.00
10/20/01	Bill	40	$14.00	$560.00	9/11/02	Bill	8	$14.50	$116.00
10/27/01	Bill	56	$14.00	$784.00		Total	1642		$23,137.00

Parts total $ 12,007.97

Labor total $23,137.00

Grand total $35,144.97