Compost Demonstration Project, Tulare County:

Green Material Compost in Field Crop Production

March 1997

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Executive Summary

The compost project in Tulare County demonstrated the use of green material compost made from grass clippings and plant prunings from the cities of Visalia, Tulare, and Kingsburg in commercial field crop production. Three treatments were compared:

- Commercial synthetic fertilizers without soil amendments ("conventional" treatment).
- Poultry manure in conjunction with commercial synthetic fertilizers.
- Green material compost in conjunction with commercial synthetic fertilizers.

Each treatment, replicated three times in a randomized complete block design, was approximately 3.6 acres. Green material compost was applied at a rate thought to be a reasonable cost for field crop economics. In 1995, it was applied at 3.5 tons dry weight per acre, and in 1996 the rate was 3.9 tons dry weight per acre.

In the first year of the demonstration, organic soil amendments were applied prior to furrowing out and making beds. A preplant starter fertilizer was applied to all treatments. During the season, nitrogen was sidedressed on all treatments, but the compost and manure treatments received 60 pounds less nitrogen per acre than the conventional treatment. Gypsum blocks were used to monitor soil moisture. Stand counts and seedling weights were taken to evaluate stand establishment. A pressure bomb measured plant-water status during the season and plant mapping tracked cotton plant growth. Although originally planned for two years of cotton production with compost applied before each planting, adjustments had to be made in the cropping sequence when grain prices shot upward and the landowner insisted our cooperator plant wheat for winter forage. Unfortunately, this decision was made so quickly that no compost could be applied prior to wheat planting and emergence. However, the wheat crop was monitored for nutrient levels and final yields were measured. Following the wheat, compost and turkey manure were spread on their respective plots. In addition, compost at the rate of 20 tons dry weight per acre was applied to two strips, one on either side of the official demonstration. Corn for silage was planted because it was too late in the season for cotton. Stand counts, gypsum block readings, and tissue analyses were taken from all treatments and the two additional strips throughout the corn crop.

No significant differences in yield were observed in the cotton or wheat. In the corn, the compost treated plots yielded statistically less than the conventional and poultry manure plots; however, this may have been a result of the randomization of the plots as the compost plots were located at the west end of each replication. The irrigation pattern went from east to west with the result that in each replication the compost plot was watered last. Tissue analysis showed a few differences in the crops, but they were not consistent among nutrients or with time. No differences in insect populations were observed.

Gypsum blocks indicated no significant difference in water availability to crops, although soil variability and the size of the plot, which required several days to irrigate, made

interpretation of readings difficult. Pressure bomb readings in the cotton crop also showed no consistent difference in crop water status.

Gypsum block readings, tissue analyses, or yields from the two strips with high rates of 20 dry tons per acre in the last year of the trial did not show any difference from the plots with two years of low compost rates (3.5-3.9 dry tons per acre).

Given that there was no tangible or measured benefit from just two years of low rates of green material compost or from one year of a relatively high rate, the economics of green material compost applications in field crops are not favorable, at least from this short-term test. Benefits from long-term applications at relatively low annual rates are still a possibility. The unanswered questions are how many years of applications are needed and at what rate before benefits can be documented and economic returns can be documented.

However, the compost itself was very amenable to large-scale commercial agriculture application. Analyses demonstrated that it provided some nutrients and was lower in salts than manure. Commercially available loading, hauling, and spreading equipment handled the compost without any problems. It spread evenly from a manure spreading truck without any problems of bridging.

Introduction

Local governments in California are reducing the volume of materials being disposed at landfills to conform with a mandate set by the state legislature. A large segment of materials that have been sent to landfills is plant residue from home and commercial landscapes that include tree prunings, leaves, and grass clippings. Collectively, these have been referred to as "green material" by many people involved in solving the material management challenge. These materials can be composted to produce an organic soil amendment with plant nutritional value. The amounts of composted materials being produced and forecast to be produced in the state require marketing outlets. Agriculture has been considered to be a prime consumer of the compost due to the acreage involved; therefore, agriculture represents a large potential market. Expected benefits to soil and crops from compost applications include the addition of nutrients in lieu of fertilizer and added organic matter which is considered to be relatively low in most California soils. Information on the economic benefits in commercial crop production have not been well documented although there have been many testimonials by growers and marketers promoting its use.

Field crops represent a large acreage in the San Joaquin Valley. For example, each year cotton is planted on close to a million acres in the counties stretching from Kern north up through Merced. If green material compost were shown to be practical and economically beneficial, field crops could represent a very large market. However, field crops are considered to be "low value" crops and their profit margins, on average, tend to be lower than vegetable, fruit, and nut crops. Incorporation of compost into the cultural practices of field crop production has to be at a modest level in order to fit into the crop budget.

Field crops usually remove from 150 to 250 pounds of nitrogen per acre, so relying on compost to provide 100 percent of the nitrogen needed would require a 10 dry tons per acre rate if the nitrogen content was 1 percent and it was all available during the crop season, which is unlikely. This project chose to take a modest rate of compost, approaching 5 tons per acre as delivered, to be repeated each year of the trial.

Green material compost is competing with synthetic fertilizers and animal manures, which in Tulare County are usually dairy or poultry manures. The grower cooperator for this demonstration project has a history of applying poultry manure prior to cotton. Based on these factors, this demonstration compared green material compost application to conventional synthetic fertilization practices and to poultry manure applications. As our green material compost rate did not provide the total nitrogen needs of the crops, and because it would not have been fair to compare a low nitrogen practice to a sufficient application, the compost and manure treatments were supplemented with nitrogen in the first crop. In following crops, all treatments received the same synthetic fertilizer rates with the compost and manure superimposed on them.

The original project plan was to evaluate these materials on a field that would be planted to cotton in both years. However, an unusually high market price for wheat and corn grain resulted in a demand by the landowner that the grower/cooperator plant wheat for winter forage for local dairy consumption. The forage was harvested too late in spring for cotton to be a commercially successful crop, and the decision was made to grow silage corn following the forage harvest.

An equally important objective of the project was to evaluate how well green material compost could be loaded, hauled, and spread with large-scale, commercial equipment and practices used in field crop production. Each plot was therefore large: 120 feet wide by the length of the field which was 1300 feet, or approximately 3.6 acres.

The Tulare project was a team project with expertise from city and county government departments responsible for material management, compost producers, University of California Cooperative Extension public information representative and farm advisors, and an experienced second generation field crops farmer. A full list of names and titles is provided in Appendix A.

Materials and Methods

The compost used in this project was produced from green material from the cities of Kingsburg, Visalia, and Tulare at Tulare County Compost and Biomass, located approximately 8 miles southeast of Visalia and 7 miles from the project site. Samples collected from the pile shortly before application were compiled and sent to U.C. Davis for analysis. At the time of application, samples were also taken for moisture analysis in order to determine the dry weight applied.

The trial design was a complete randomized block with three replications (Figure A, Appendix D). Each plot was 120 feet wide by 1300 feet long (the length of the field).

Treatments were: 1) conventional fertilizer applications as commonly used in San Joaquin Valley crop production; 2) poultry manure broadcast prior to ground preparation with additional fertilizers applied; and 3) green material compost broadcast prior to ground preparation with additional fertilizers applied. Prior to the silage corn crop in 1996, two strips on either side of the demonstration project were treated with a 20 dry tons per acre rate of compost. Although these strips were not officially part of the trial and data from them could not be analyzed with results from the other plots, these strips did provide an opportunity to observe impacts from a single, relatively high compost application. Dates and rates of compost and manure applications are shown in Table 1, Appendix C.

In the first application, February 1995, rates of compost and chicken manure were estimated by the amount delivered, the truckloads applied to each plot, and by tarping a small area of the plot and weighing the amount of material on the tarp. This latter method was not satisfactory as the tarp was rather smooth in texture and both the compost and manure tended to slide and blow off the tarp from the force of spreading and the speed of the truck. In the second application, May 1996, a large scale weighed each truckload before it was spread on each compost and manure plot. The compost was handled with available commercial equipment used for loading, hauling, and spreading manures.

In the first year of the trial, chicken manure was applied because, at the time of the year it was spread, turkey manure was not available. In fact, our source was in Fresno County which, except for trial purposes, would have been too far to economically haul the manure. In the second year of the trial, turkey manure was applied. A & L Labs in Modesto analyzed the poultry manure both years.

Skip loaders were used for loading trucks into commercial hauling trucks. Compost and poultry manures were spread with the same truck, a chain driven manure spreader. After spreading, the compost was incorporated simply by furrowing out. With one pass of the tractor, all evidence of either compost or manure was obliterated and plots could only be differentiated by the permanent markers at both ends of the field.

Although compost and manures were spread as evenly as possible throughout the plot, harvest yield data were measured on center strips through the plots.

The field had two soil types: Traver fine sandy loam and Cajon sandy loam. There were some sand streaks scattered in some plots which resulted in small areas with small and water-stressed plants. A composite soil analysis from the top foot of soil was taken prior to initiation of the demonstration. After harvest of the final crop in October 1996, soil samples from each plot were taken at 0-6 inches and 6-18 inches in depth. The field was irrigated with a combination of canal, well, and dairy lagoon water. This last component, unfortunately, made it impossible to closely track nutrient inputs, especially nitrogen.

Gypsum blocks, placed at several depths, were located in two areas of each plot for the corn and cotton crops. In the 1995 cotton crop, they were at 6, 12, 18, 24, and 36 inches at the northern location in each plot and at 6,12,18, and 24 inches at the southern location in each plot. No gypsum blocks were installed in the winter forage plot. In the

1996 corn silage crop, there were again two locations with multiple gypsum blocks at 6, 12, 18, and 24 inch depths.

Crop moisture status was monitored in the 1995 cotton crop with a "pressure bomb" instrument which measures the tension of the water in the xylem tissue. With corn in 1996, use of a pressure bomb was difficult because of the shape of corn leaves.

Plant tissues were analyzed for nitrogen, phosphorus, potassium, and zinc during each crop season.

1995 Cotton Crop

In the first year of the trial, the cotton variety Maxxa was planted. Throughout the season all plots were treated in exactly the same way with the one exception of the rate of nitrogen applied at the sidedress application in June (Table 2, Appendix C). Treatments with the organic amendments (chicken manure and green material compost) received 70 pounds less nitrogen per acre than the conventional treatment at that time. High aphid populations developed and an insecticide was applied. Gypsum block and pressure bomb readings were taken on a weekly basis when schedules permitted. Plant tissues were collected at early bloom, full bloom, and "cut-out" for nutrient analysis. Forty leaves in each of two locations were collected. The crop was harvested in October and yields were measured from the center eight rows of each plot.

1995/96 Winter Forage Crop

The trial was originally planned for two years of cotton. However, due to the high grain prices for both winter wheat and corn, the landowner, whose relatives have a dairy within 2 miles of the demonstration, insisted our grower cooperator plant winter forage. The wheat variety Yecora Rojo was planted in late 1995 without any additional manure or compost. The only fertilization was a topdressing of urea at 125 pounds per acre, or 62 pounds per acre of nitrogen. All plots received the same rate. In addition, one of the two irrigations was with dairy lagoon water. The field was sprayed for weeds with MCPA and Banvel. The only measurements taken during the season were tissue analyses at tillering, jointing, and flag leaf. At harvest, plant heights were measured and yield weights were taken. Apparent rumen digestibility was determined with a fistulated steer at the University of California Veterinary Medicine Teaching and Research Center in Tulare, California.

1996 Silage Corn Crop

Compost and turkey manure were applied to their respective plots after the winter forage harvest. Rates were 3.9 dry tons of compost per acre and 2.2 dry tons of manure per acre. Furrows were then made and the field preirrigated. The variety Pioneer 3223 was planted in early June. All plots received equal rates of fertilization which was a sidedress application of ammonia shanked to the side of the rows at a rate of 150 lbs nitrogen per acre. The first irrigation was with dairy lagoon water. Corn tissues were sampled three times during the season for tissue analysis, and gypsum blocks were monitored. Insects were observed, with no significant populations of any kind developing. The field was not sprayed with insecticides or herbicides. The field was harvested September 19, 1996. Five samples per plot were taken for quality analyses in addition to yield data.

Several outreach methods were used to publicize the demonstration. These included a field day, radio spots, news releases, seminars, and a newsletter. A list of activities is provided in Appendix B.

Findings

Soil analyses for samples from the top foot of soil taken prior to the initiation of the demonstration are provided in Table 3, Appendix C. The soil on average was adequate in phosphorus, potassium, and zinc and almost neutral in pH. The west half tended to have a little more sodium (Na) and slightly higher exchangeable sodium percentage (ESP). However, there were some sand streaks that crossed over several plots, causing areas of reduced growth, adding to the variability of yield results and collection and interpretation of other data. Residue from the preceding crop probably accounts for the one high organic matter reading of 1.5 percent. The other readings of 0.6-0.8 percent are more typical of these soils.

Compost Characteristics

The compost had a nice appearance with practically no objectionable odor. Particles were fine and there were no foreign objects. The compost loaded easily with skip loaders, unloaded easily from dump trucks, and spread evenly with commercial chain driven manure spreaders. In 1996, the compost pile heated up overnight between delivery and application, indicating that the composting process had not been totally completed. The green material composts each year were very similar in nutrient content (Table 4, Appendix C). In general the compost was lower in nitrogen, phosphorus, and potassium than the poultry manures. The manures had higher salts than the compost (manure analyses listed in Table 5, Appendix C).

1995 Cotton Crop

Gypsum block readings (Table 6, Appendix C), pressure bomb readings (Table 7, Appendix C), and plant mapping data were essentially the same for the three treatments. Stand counts taken in early May and June were also the same for all treatments (Table 8, Appendix C). Petiole analyses at early bloom, full bloom, and cut-out showed no differences among treatments for nitrogen, potassium, or zinc (Table 9, Appendix C). Early bloom nitrate readings were near the low end of the recommended threshold, with the check actually averaging at a value lower than the 10,000 ppm threshold (Table 10, Appendix C). The only nutrient analyzed that showed a difference in petiole concentration was phosphate. Although analyses were above the recommended minimum thresholds for all treatments at all three sample dates, the compost was significantly lower at early bloom than the other two treatments. At full bloom, petioles from the compost and manure had lower levels than the check. At cut-out, petioles from all plots tested the same.

Cotton yields throughout Tulare County were below average in 1995 and the demonstration project was no exception. Poor spring weather and high insect problems were two reasons contributing to a below average year. There were no differences in yield or cotton quality factors among the treatments (Table 11, Appendix C).

1995/96 Wheat Forage Crop

Tissue analyses for nitrate, phosphorus, and potassium showed no differences at any of the three sample dates (Table 12, Appendix C). However, the compost treatments had lower zinc levels than the poultry manure plot at tillering, and was lower than both the poultry manure and conventional check plot at jointing. However, at the flag leaf stage there were no differences among the treatments. The lower zinc had no effect on height or yield of the forage as there were no differences among treatments (Table 13, Appendix C). There were no differences in apparent rumen digestibility, although digestibility was highest for the compost plot samples

1996 Silage Corn Crop

Gypsum block readings were not different for any of the treatments including the strips on either side of the demonstration area that received 20 dry tons per acre of compost (Table 14, Appendix C). Tissue analyses differed only for zinc (Table 15, Appendix C). In the first sampling, tissue from the turkey manure plots had a higher level of zinc than tissues from either the conventional check or the compost treatments. At the second sampling, tissue analyses from the compost treatment were as high as tissues from the turkey manure treatment and were higher than those from the conventional check. At the final sampling date there were no differences among the treatments. Plant populations at establishment were the same for all treatments. However, despite equal stands and tissue analyses that were not significantly different from the other treatments, the compost treatment had a significantly lower yield than both the conventional check and the treatment with the turkey manure (Table 13, Appendix C). The compost treatment produced 1.5 less tons per acre when weights were adjusted to 70 percent moisture. There is no obvious reason for the decrease in yield based on tissue analysis, gypsum block readings, insect observations, or stand. The yield reduction might be an artifact of the plot randomization as the compost treatment was the westernmost plot in each replication (Figure 1 in Appendix D). The result of this plot randomization was that in each replication, the compost treatment was the last to receive water at each irrigation event. Corn yields are extremely sensitive to water deficiencies and, coupled with extreme heat in August of 1996, the pattern of irrigation could explain, at least in part, the yield reduction. Supporting evidence for this suggestion is that the average yield per replication (average of all three treatments in each replication) declined from east to west.

Analysis of the harvested corn indicated that the two plots with organic amendments, poultry manure and compost, were slightly, but statistically significantly, higher in percent crude protein than the conventional check. There were no differences in acid detergent fiber or total digestible nutrients (Table 17, Appendix C).

Final Soil Analyses

In the top 6 inches of soil, the only significant differences were found in the levels of magnesium (Mg), potassium (K), and nitrate nitrogen (NO_3-N (Table 18, Appendix C). The treatments with poultry manure or compost were higher than the conventional check in milliequivalents per liter of magnesium (Mg) and potassium (K). Although analysis of potassium as parts per million (ppm) also showed higher levels in the two organic amendment treatments than in the check, this difference was not statistically significant. The poultry manure treatment also had a higher level of nitrate nitrogen in the top 6 inches than the other treatments. The compost treatment was intermediate between the check and the manure for nitrate nitrogen.

With the exception of percent organic matter, there were no differences among the treatments for any of the characteristics tested at the 6-18 inch depth. This is not surprising as changes would be expected to show up first in the top 6 inches where the compost and manure were located. The difference in organic matter which occurred at this deeper level was unexpected and, although statistically significant, is probably not a real difference. Also, given the very low organic matter levels, less than 0.5 percent, the difference is probably not biologically significant either.

Conclusions

Measurable benefits from green material compost were not observed or documented during the two years of this project. These included soil and water measurements, insect counts, plant mapping, and plant-water status measurements for cotton, tissue and soil testing, yield and quality data. There were some tissue test differences for some of the crops, but they were not consistent throughout the trial. These differences also did not seem to be significant in affecting yields.

Yields were not significantly different for the corn or winter wheat forage crops but were significantly lower in the compost treatment for the silage corn crop. Nothing was observed or measured during the corn season to explain this lower yield except the layout of the trial and the timing of irrigation sets, which unfortunately put the compost treatments at a disadvantage because in each replication the compost plot was the last to receive water. If the compost itself had been responsible for some negative interaction that led to a suppression of corn silage yields, it would be expected that the 20 dry tons per acre strips applied on either side of the demonstration area would have had an even greater impact on yield and that did not happen.

Two factors contributed to the lack of response to green material compost. The original plan was to demonstrate its use in cotton, and funds were received too late in 1994 to start the project, leaving only two crop seasons to build up benefits from compost. Secondly, relatively low rates of compost were chosen for the project because they would be a reasonable expense level on an annual field crop production budget. In other words, relatively low rates of compost were used for just two years, so it is not too surprising that yield or soil characteristic impacts did not occur.

The cost of the compost, including hauling and spreading, was about $16.00 to $18.00 on an "as received" basis. The green material compost in the trial ranged from 18 to 20 percent moisture, so the cost of the treatments averaged around $21.00 per dry ton or $75.00 per acre at rates we applied. The demonstration plot was 7 miles from the compost source; for farms further away hauling costs may increase. Cotton was the only crop in which fertilizer rates were adjusted to compensate for the extra cost of compost. The nitrogen sidedressing rate was reduced by 60 pounds of nitrogen per acre, a savings to the grower of only $30.00 compared to the $75.00 per acre cost of compost.

No negative aspects to the compost were observed. As explained above, if the corn yield reduction were due to compost treatments, yields should have been even more depressed with the 20 dry tons per acre rate applied to the side of the demonstration area and they were not. The compost was a clean, uniform material that was very easy to handle and spread with commercial equipment. The odor was mild if noticeable at all and not objectionable, which was very different from the poultry manures. However, both compost and manure were quite dusty to spread even when their moisture contents were measured at 20 percent.

Recommendations

Many growers are interested in compost, and their questions revolve around the following points: the quality of compost specifically concerning consistency, nutrient content, lack of contamination, crop response, and the cost.

Efforts to guarantee quality and to label individual composts with nutrient analyses and other pertinent information are very important to the acceptance of compost materials by growers. These activities should continue.

For field crop growers, crop response and cost are major considerations and are interrelated questions. Because of cost considerations, high compost rates are unlikely, so the questions become how much can be afforded each year and how many years will it take to see a response. An important question is whether or not organic matter can build up in California soils under California weather and irrigation practices with low annual applications.

There are more trials looking at compost, and information from these will help answer some of the uncertainties. Unfortunately, this demonstration showed that at rates of 3.5-3.9 dry tons per acre, two years is not enough to make a positive impact on crop growth.

Due to the cost, in the short term field crop growers will not be looking at straight green material composts as their only fertilizer source. For many field crops, the nitrogen demand is relatively quick and high. Compost rates would have to be too high to provide all nitrogen needed. Co-composting with manures would increase their nutrient value but also would increase salt content, which would be a factor in some locations.

Another consideration is that for some crops it is important that nitrogen become less available as the season ends to help with defoliation or quality factors. The nitrogen release characteris-tics of composts need to be further de-
fined. Finally, if soil organic matter builds up to the point that it serves as a "nitrogen bank," it will take time and experience for growers to learn to manage the nitrogen from that source.

In summary, for field crop growers compost prices will have to be low to be used at high rates. Low rates of compost for the short term do not appear to contribute noticeably to any benefits in crop performance or soil characteristics. Information on benefits from long-term use at low rates under California production situations is not readily available. The green material compost in this trial, however, demonstrated no negative characteristics or handling problems. Growers who want to experiment should feel comfortable that reputable compost producers produce a product than won't harm their crops or contaminate their fields.

Appendices

Appendix A

List of Project Team Members

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Appendix B

Outreach Activities for Tulare County Demonstration Project

In order for the compost demonstration project to be effective, a comprehensive education and public information program needed to be developed. Several primary audiences were targeted which included the general public, material haulers, compost manufacturers, and agricultural end users.

These audiences were targeted with the following campaigns:

Tulare County Farm Show

In February 1996 and February 1997 (scheduled), the cooperators sponsored a booth in conjunction with the California Integrated Material Management Board (CIWMB) at the Tulare County Farm Show. This annual event attracted a large audience within the agricultural industry. Attendance at the 1996 show was estimated at over 100,000 visitors. This forum provided ample opportunity to disseminate the results of the project to many interested parties, both inside and out of the agricultural community. The booth included photographs illustrating the process, handouts, and samples of the compost applied at the project site. Staffing was jointly provided by the University of California Cooperative Extension, the City of Visalia, Tulare County Solid Material Division, and Tulare County Compost and Biomass (TCCB).

At the Farm Show, a seminar was sponsored by the CIWMB whereupon several of the compost demonstration projects were discussed by multiple speakers. The primary audience was growers and interested members from the public. Approximately 45 people attended the seminar.

Field Day

This campaign was targeted at the general public as well as growers. Municipal and private material haulers, the compost manufacturer, and the general public were invited to the composting facility to observe the entire "loop" involved in the production and application of compost. The public got an opportunity to visit the composting facility and witness firsthand the procedures involved in the making of compost. The general public begins the loop when they put their green material in their green material containers (if such service is available in their respective communities). The municipal and private material haulers then collect the material and deliver it to the composting facility where the material is examined for contaminants and then "windrowed." The public observed the windrows being turned and watered. It was explained that temperatures in the windrows reach 130 to 170 degrees which kills virtually all seeds and pathogens. The final compost product was on display. It was explained that this clean, odor-free, nutrient rich compost was the product applied in the demonstration project.

After touring the facility, all in attendance were then taken to the demonstration site where the compost had been applied, thus demonstrating the closing of the loop. Details of the various applications, the methodology employed to measure the respective yields and the tests administered to determine soil moisture were all explained.

AgAmend

AgAmend is a limited edition newsletter which discusses topics related to the use of compost in commercial agriculture. Those in the agricultural community are the primary target for the newsletter followed by those in the compost industry and the general public. Topics typically include updates on not only the Tulare County demonstration project but the other demonstration projects funded by the CIWMB as well. Other topics included segments on the production of compost and the role of compost in the scheme of material management. Compost terms, facts, and trivia are also regularly included in the newsletter.

Flyers

Flyers were prepared and disseminated at both the Farm Show and the City of Visalia's annual yard material drop-off program. The yard material drop-off program was held from mid-November of 1995 through mid-January of 1996. Residents of the city of Visalia were allowed to dispose of their clean yard material at no charge. Informational flyers were handed out to the participants in this program. The flyers listed the amount of green material that was buried in Tulare County landfills annually and indicated that this material could be made into compost. The flyers mentioned that the demonstration project was implemented to study the use of this compost on locally grown cotton.

Media Releases

June 1994 news release: "Three Projects in the Valley Study Use of Urban Material in Ag." Distributed to Valley press, statewide ag press, and placed on UC NewsWire.

June 1994 U.C. Cooperative Extension radio story: "Initiation of Garden Compost Project." Distributed to 76 radio stations.

March 1995 press field day attended by two TV stations and three print reporters.

March 1995 news release: "Study to Determine Whether Garden Compost Benefits Ag." Distributed to Valley press, statewide ag press, and placed on UC NewsWire.

March 1995 U.C. Cooperative Extension radio story: "Project Underway." Distributed to 76 radio stations.

April 1995 news tip, "Recycling Grass and Leaves," in U.C. DANR 25th Anniversary Earth Day tip sheet. Distributed to all major newspapers and ag publications statewide and placed on UC NewsWire.

October 1995 newsletter article: "Is City Trash Ag Treasure?" UC Valley Calendar, 6,500 circulation.

April 1996 news tip, "Agriculture Is Part of the Material Diversion Solution," in UC DANR Earth Day tip sheet. Distributed to all major newspapers and ag publications statewide and placed on UC NewsWire.

October 1996 magazine article in U.C. research publication *California Agriculture*: "Agriculture Leads the Green Material Recycling Revolution." Distributed to 20,000 farmers and others in the United States and abroad.

Appendix C

Table 1. Dates and Rates of Compost and Manure Applications, Tulare County Compost Demonstration Project

Treatments	Dates applied	Rate applied dry tons per acre
Poultry manure with additional fertilizer		
Chicken manure	2/21/95	2.5
Turkey manure	5/3/96	2.2
Composted green material with additional fertilizer	2/21/95 5/3/96	3.5 3.9
High compost rate - 2 strips on each side of trial	5/3/96	20.0

Table 2. Fertilizer Applications in 1995 Cotton Crop, Tulare County Compost Demonstration Project

Treatment	Pounds Per Acre				
	Preplant[1]			Sidedress[2]	Bloom[3]
	N	P_2O_5	K_2O	N	K_2O
Conventional check	10	25	25	130	3.6
Chicken manure @ 2.5 tons/acre	10	25	25	70	3.6
Compost @ 3.5 tons/acre	10	25	25	70	3.6

[1]Applied as 25 gal/acre of 4-10-10.
[2]Applied as anhydrous ammonia shanked into beds.
[3]Aerial application of potassium solution.

Table 3. Soil Analyses for Tulare County Compost Demonstration Project

Two composite samples, one from the east half of trial area and one from the west half of trial area

	Saturation %	pH	EC mmhos	Ca meq/l	Mg meq/l	Na meq/l	K meq/l	ESP	B ppm	NO_3-N ppm	PO_4-P ppm	K ppm	Zn ppm	% Org. matter
0-6 Inches														
East half of area	25.0	7.6	1.08	5.5	1.7	3.6	0.7	1.5	0.1	9.0	11.5	179	1.2	0.6
West half of area	23.5	7.7	1.11	4.2	1.5	5.4	0.7	3.5	0.1	7.3	17.8	250	1.4	0.8
Average	24.0	7.65	1.10	4.8	1.6	4.5	0.7	2.5	0.1	8.2	14.6	214	1.3	0.7
6-12 Inches														
East half of area	25.5	7.6	1.05	5.4	1.9	3.2	0.9	1.2	0.1	7.0	13.8	203	1.2	1.5
West half of area	24.0	7.7	1.08	4.4	1.5	4.9	0.7	2.9	0.1	8.3	19.8	261	1.5	0.8
Average	24.8	7.65	1.06	4.9	1.7	4.0	0.8	2.0	0.1	7.6	16.8	232	1.4	1.2

Table 4. Compost Analyses, Tulare County Compost Demonstration Project, 1995/96[1]

	N %	P_2O_5 %	K_2O %	Na meq/l	Zn ppm	pH	Ec mmho/cm	Dry bulk density lbs/ cu yd	C:N	NH_4 ppm	NO_3 ppm	C %	Ash %
1995 Compost	0.96	0.57	0.78	4.7	27	7.5	3.7	1404	12.1	267	350	11.7	74.5
Lbs nutrients applied in 3.5 tons/acre	64	39.9	54.6	0.76	0.2								
1996 Compost	1.39	0.86	1.32	25.6	172	7.6	5.7	1374	9.2	104	329	12.8	72.5
Lbs nutrients applied in 3.9 tons/acre	108	67.1	103.0	4.5	1.3								

[1]Analyses by Dr. S. Pettygrove, UC Davis, and calculated on a dry weight basis.

Table 5. Poultry Manure Analyses, Tulare County Compost Demonstration Project, 1995/96[1]

Treatment	N %	P_2O_5 %	K_2O %	Ca %	Na %	Zn ppm	S %	Mg %
1995 chicken manure	2.40	3.71	2.19	1.78	0.51	410	0.36	0.41
Lbs nutrient per acre applied 2/21/95 at 2.5 tons/acre	120	185	110	89.0	25.5	2	18	20.5
1996 turkey manure	0.92	8.11	3.89	3.83	1.4	550	0.55	0.77
Lbs/acre applied 5/9/96 at 2.2 tons/acre	40.5	357	171	169	62	2.42	24.2	34

[1]Analyzed by A-L Western Agricultural Laboratories, Modesto, CA.

Table 6. Average Gypsum Block Readings for 1995 Cotton Crop, Tulare County Compost Demonstration Project[1]

Treatments	6/2	6/9	6/16	6/23	6/30	7/7	7/13	7/20	7/27	8/11	8/18	8/25	9/1
6-Inch Depth													
Conventional check	60.2	37.7	22.0	90.2	15.8	91.5	24.0	73.5	8.2	10.2	10.5	2.0	81.7
Poultry manure	64.5	47.2	22.5	91.3	16.7	91.7	19.5	59.7	7.7	8.7	7.5	10.0	58.0
Compost	56.3	33.8	21.5	89.0	13.0	90.8	24.0	62.5	8.3	28.7	16.7	10.0	39.5
LSD (.05)	NS	NS	NA	NS	NS	NS	NA	NS	NS	NS	NS	NA	NS
CV %	24.9	38.5		6.2	63.9	1.2		25.6	39.6	115.1	133		52.2
12-Inch Depth													
Conventional check	79.0	55.2	30.0	93.7	29.7	93.3	49.0	71.3	24.8	17.5	7.5	3.0	53.3
Poultry manure	81.2	62.7	34.0	93.0	38.8	91.7	47.5	65.2	15.7	45.0	11.6	20.0	56.8
Compost	82.7	59.5	40.0	92.8	38.7	93.3	52.5	70.5	16.2	41.0	24.7	12.0	42.5
LSD (.05)	NS	NS	NA	NS	NS	NS	NA	NS	NS	NS	NS	NA	NS
CV %	8.8	18.2		3.0	56.7	2.5		30.2	69.7	38.1	113.7		32.8
18-Inch Depth													
Conventional check	90.0	84.4	73.5	93.3	90.8	93.8	71.8	77.0	49.7	37.5	9.5	3.0	37.5
Poultry manure	91.1	86.5	66.5	93.0	70.3	91.8	61.3	71.2	40.5	45.5	24.7	18.0	54.7
Compost	88.3	77.2	56.5	92.8	78.5	93.3	69.5	68.0	20.3	30.5	15.7	8.0	45.2
LSD (.05)	NS	NS	NA	NS	NS	NS	NS	NS	NS	NS	NS	NA	NS
CV %	1.7	4.1		2.3	26.7	2.8	12.8	23.7	46.7	8.6	68.6		45.5
24-Inch Depth													
Conventional check	90.7	89.0	86.5	93.2	93.2	93.8	81.0	89.5	66.0	58.1	22.8	50.0	15.3
Poultry manure	92.7	90.5	90.0	93.7	90.8	92.3	69.5	81.2	51.8	55.3	29.7	56.0	50.5
Compost	90.3	88.5	83.5	92.7	91.8	92.7	94.0	77.5	46.3	32.8	19.8	43.0	26.2
LSD (.05)	NS	NS	NA	NS	NS	NS	NA	NS	NS	NS	NS	NA	NS
CV %	1.2	2.6		2.0	5.2	3.8		22.3	28.8	30.6	15.7		54.7
36-Inch Depth													
Conventional check	91.0	90.0	89.0	92.0	92.7	92.7	87.8	91.0	82.7	48.1	NA	NA	37.3
Poultry manure	91.3	90.1	91.5	92.0	91.7	92.0	85.3	84.7	70.7	92.0	NA	NA	59.3
Compost	90.3	90.1	90.5	90.3	91.7	92.0	89.3	77.7	48.3	17.3	NA	NA	11.3
LSD (.05)	NS	NS	NA	NS	NS	NS	NS	NS	NS	15.6	NA	NA	NS
CV %	2.4	3.0		2.9	3.1	4.0	6.6	20.7	57.0	2.7			92.1

[1]There were two stations of gypsum blocks for each depth in each plot. High readings (in the 90's) represent wet soil, near field capacity.

Table 7. Average Pressure Bomb Readings from 1995 Cotton Crop, Tulare County Compost Demonstration Project[1]

					Date					
Treatment	6/2	6/9	6/23	6/30	7/7	7/14	7/21	7/28	8/11	8/18
Conventional check	11.2	10.9	13.1	8.2	8.5	12.2	12.2	15.2	12.5	14.3
Poultry manure	11.3	12.7	14.0	10.1	9.2	---	13.4	17.9	14.7	21.6
Compost	11.4	10.8	13.0	8.6	9.0	12.4	13.7	17.0	14.4	17.2
LSD (.05)	NS	NS	NS	NS	NS	NA	NS	NS	NA	NA
CV %	9.3	18.1	8.9	22.8	7.3	NA	11.2	16.6	NA	NA

[1]Ten readings were taken per plot. Higher readings indicate a higher level of water stress. Means are based on three replications. Hyphens (---) indicate no readings for any replication of a particular treatment were taken due to irrigation. NS indicates means were not significantly different at the 5% level of probability. NA indicates that data from that date was not analyzed because of a high number of missing plots due to irrigation.

Table 8. Established Stand Count for 1995 Cotton Crop in the Tulare County Compost Demonstration Project

	Cotton Stand Count	
Treatment	5/8/95	6/2/95
Conventional check	50.6	50.2
Chicken manure	49.3	49.0
Compost	50.9	50.8
CV %	2.09	3.34
LSD (.05)	NS	NS

Table 9. Cotton Petiole Analyses, Tulare County Compost Demonstration Project, 1995

Treatment	Early bloom 7/13		Full bloom 7/28		Cut-out 8/18
Nitrogen - Petiole NO_3 (ppm)					
Conventional check	7,653		4,208		1,143
Chicken manure	10,063		4,107		1,797
Compost	12,203		4,722		1,037
CV %	15.1		22.0		64.0
LSD (.05)	NS		NS		NS
Phosphorus - Petiole PO_4 (ppm)					
Conventional check	4,104	a	3,103	a	2,346
Chicken manure	3,927	a	2,692	b	2,100
Compost	2,917	b	2,313	b	1,934
CV %	10.0		6.6		16.1
LSD (.05)	829		403.6		NS
Potassium - Petiole %					
Conventional check	5.91		5.39		4.16
Chicken manure	6.21		4.98		4.04
Compost	4.20		3.01		4.39
CV %	13.3		11.1		10.1
LSD (.05)	NS		NS		NS
Zinc - Petiole (ppm)					
Conventional check	17.7		10.8		20.1
Chicken manure	14.7		10.7		16.7
Compost	13.7		12.0		17.4
CV %	22.4		9.1		10.8
LSD (.05)	NS		NS		NS

Table 10. Recommended Petiole Nutrient Levels for Cotton, Tulare County Compost Demonstration Project

		Early bloom	Full bloom	Cut-out
NO_3-N (ppm)	L	10,000	3,000	1,500
	H	18,000	7,000	3,500
PO_4-P (ppm)	L	1,500	1,200	1,000
	H	2,000	1,500	1,200
% K	L	4%	3%	1.5%
	H	5.5%	4%	2.5%

Table 11. 1995 Cotton Yield and Lint Quality Data from the Tulare County Compost Demonstration Project

	Yield			Lint Quality		
Treatment	Gin turnout %	Lint/acre lbs	Color Leaf guide	grade	Length	Staple
Conventional check	34.6	971	28	4	110	35
Chicken manure @ 2.5 tons/acre + fertilizer	35.1	977	24	4	109	35
Compost @ 3.5 tons/ acres + fertilizer	35.0	921	24	4	110	35
CV %	1.33	11.92	13.1	15.79	1.9	1.89
LSD (.05)	NS	NS	NS	NS	NS	NS

Table 12. Tissue Analyses for Wheat Forage Crop, Tulare County Compost Demonstration Project

	Nitrate			Phosphorus			Potassium			Zinc		
Treatments	3/7/96	3/28/96	4/9/96	3/7/96	3/28/96	4/9/96	3/7/96	3/28/96	4/9/96	3/7/96	3/28/96	4/9/96
Conventional check	7,457	10,033	9,170	3,262	3,870	3,393	5.98	6.18	3.75	27.83 ab	24.67 a	17.00
Poultry manure + fertilizer	8,443	11,967	10,587	3,867	4,523	4,343	5.97	6.42	3.81	31.33 a	26.00 a	11.67
Compost + fertilizer	6,457	11,463	9,293	3,273	4,523	3,870	5.76	5.46	3.60	26.33 b	17.67 b	25.67
CV %	13.49	11.39	10.41	10.48	14.19	18.67	5.73	7.54	11.60	5.36	11.57	60.64
LSD (.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.97	5.97	NS

Table 13. Yield and Digestibility of 1995/96 Winter Forage Crop with Organic Amendments Applied Prior to the Preceding Cotton Crop, Tulare County Compost Demonstration Project

rumen	Height at harvest (inches)	Yield tons/acre @ 65% moisture	Apparent digestibility[1] (%)
Conventional fertilizer	33.3	15.14	51.5
Poultry manure + fertilizer	34.3	14.86	50.7
Compost + fertilizer	33.5	15.71	55.0
CV %	1.56	12.86	5.1
LSD (.05)	NS	NS	NS

[1]Apparent rumen digestibility based on dry matter disappearance in 24-hour in vivo test using a fistulated steer.

Table 14. Gypsum Block Readings for 1996 Cotton Crop, Tulare County Compost Demonstration Project[1]

	Date Gypsum Blocks Read													
Treatments	7/8	7/11	7/15	7/18	7/25	8/1	8/8	8/12	8/19	8/30	9/6	9/10	9/12	9/26
6-Inch Depth														
Conventional check	36.8	94.7	51.2	32.5	78.5	44.2	42.0	89.2	15.8	56.8	77.8	73.3	58.5	70.8
Poultry manure	38.1	95.0	59.0	18.3	90.0	36.7	40.3	92.5	11.7	64.7	91.2	70.7	38.8	91.7
Compost	35.6	94.2	80.3	40.8	92.2	35.0	72.7	91.2	39.3	55.0	82.0	65.0	40.3	82.8
LSD (.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV %	7.3	3.0	17.5	15.6	23.2	11.8	31.3	5.4	114.4	26.6	28.0	39.6	56.4	30.2
High compost	53.0	91.5	53.5	49.2	93.5	52.5	40.8	53.0	57.5	94.5	88.2	64.5	56.8	93.2
12-Inch Depth														
Conventional check	40.5	95.0	90.7	44.3	86.8	57.5	61.3	71.7	32.3	60.5	76.2	78.8	65.8	80.8
Poultry manure	51.2	95.0	93.3	67.8	91.5	52.5	81.0	80.7	41.2	84.8	91.8	88.0	72.0	93.2
Compost	53.5	94.2	92.7	73.6	91.5	50.8	89.2	85.7	69.0	75.3	68.8	65.5	52.0	85.2
LSD (.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV %	12.0	0.6	2.9	20.2	9.3	34.2	26.6	39.3	49.9	21.9	35.7	25.4	38.4	17.6
High compost	60.2	90.0	53.2	53.0	91.5	58.2	41.8	58.2	64.0	94.5	86.2	67.0	58.2	89.8
18-Inch Depth														
Conventional check	63.2	93.2	93.3	86.5	92.8	87.0	90.5	90.2	63.6	74.7	84.5	86.2	84.2	83.7
Poultry manure	79.7	95.2	94.5	81.5	92.5	76.3	85.7	83.5	66.0	90.7	82.7	82.3	75.5	94.0
Compost	92.2	94.7	94.2	92.2	92.0	70.5	84.0	87.8	79.2	77.2	64.2	65.2	59.8	84.8
LSD (.05)	NS	1.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV %	37.4	3.4	1.4	12.0	3.2	20.7	11.6	16.8	28.3	20.1	18.2	21.9	24.5	13.7
High compost	74.2	95.5	95.2	76.8	85.8	68.8	75.5	65.8	61.0	95.0	90.5	91.2	87.8	94.2
24-Inch Depth														
Conventional check	91.0	92.7	93.3	92.5	94.2	94.0	93.0	92.5	81.8	81.3	83.0	83.2	83.2	83.3
Poultry manure	90.2	94.7	94.0	93.5	93.8	87.2	87.7	87.5	73.7	86.0	82.8	82.3	79.7	86.7
Compost	94.5	95.9	94.8	94.8	94.0	86.7	87.8	85.2	91.0	86.8	76.0	74.3	70.2	90.5
LSD (.05)	NS	1.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV %	7.7	4.4	1.2	1.8	1.6	9.9	5.8	15.0	8.5	13.5	23.0	22.3	24.1	11.4
High compost	93.8	95.0	95.2	91.5	92.0	84.2	81.2	74.2	67.0	92.0	81.8	86.8	86.2	93.0

[1]There were two stations of gypsum blocks for each depth in each plot. High readings (in the 90's) represent wet soil, near field capacity.

Table 15. 1996 Corn Tissue Analyses, Tulare County Compost Demonstration Project

	Nitrate Nitrogen			Phosphate Phosphorus			Potassium			Zinc		
Treatments	6/21/96	7/22/96	8/1/96	6/21/96	7/22/96	8/1/96	6/21/96	7/22/96	8/1/96	6/21/96	7/22/96	8/1/96
Conventional check	4.76	3.23	2.83	0.42	0.29	0.29	2.67	2.04	1.81	49.67 b	24.17 b	21.33
Turkey manure (2.2 tons/acre) + fertilizer	4.79	3.02	2.95	0.43	0.32	0.25	2.74	2.06	1.56	59.33 a	26.67 ab	17.67
Compost (3.9 tons/acre) + fertilizer	4.71	3.26	2.98	0.40	0.34	0.29	2.71	2.19	1.84	51.00 b	30.17 a	23.00
CV %	1.30	3.91	4.50	10.09	11.66	7.00	4.96	13.41	15.78	3.83	4.00	24.99
LSD (.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	4.63	3.80	NS
*Compost (20 tons/acre) + fertilizer	4.86	3.39	2.76	0.40	0.34	0.28	2.57	2.17	2.14	56.5	29.00	19.50

*Average of two strips applied to each side of the original demonstration project at the May1996 application, following wheat and prior to the corn crop.

Table 16. Stand and Yield Summary from 1996 Corn Silage Crop, Tulare County Compost Demonstration Project[1]

Treatment	Stand count 6/13/96 plants/acre	Yield tons/acre adjusted to 70% moisture
Conventional check	29,564	25.8 a
Turkey manure (2.5 tons/acre) + fertilizer	30,290	25.5 a
Compost (3.9 tons/acre) + fertilizer	29,806	24.0 b
CV %	2.88	1.19
LSD (.05)	NS	0.68
[2]Compost (20 tons/acre) + fertilizer	29,443	24.4

[1]Values are means of three replications. Within a column values followed by a different letter are significantly different at the 5% level of probability.
[2]Average of two strips applied to each side of the original demonstration project in the application of May 1996, following wheat and prior to the corn silage crop.

Table 17. Quality Analyses (Based on 100% Dry Matter) for 1996 Corn Silage Crop, Tulare County Compost Demonstration Project[1]

Treatment	Crude protein %	Acid detergent fiber %	Total digestible nutrients %
Conventional check	7.61 a	23.25	71.43
Turkey manure (2.5 tons/acre) + fertilizer	7.73 b	23.06	71.51
Compost (3.9 tons/acre) + fertilizer	7.79 b	23.20	71.45
CV %	0.54	1.06	0.15
LSD (.05)	0.09	NS	NS
[2]Compost (20 tons/acre) + fertilizer	7.70	22.47	71.30

[1] Five samples from each plot were analyzed. Values are means of three replications. Within a column values followed by a different letter are significantly different at the 5% level of probability.
[2]Average of two strips applied to each side of the original demonstration project in the application of May 1996, following wheat and prior to the corn silage crop.

Table 18. Soil Analyses After Two Years of Compost and Poultry Manure Applications, Tulare County Compost Demonstration Project[1]

					meq/L					ppm				Organic	Total	
	N	NH_4-N	EC													matter
	SP %	pH	dS/m	Ca	Mg	Na	K	ESP	B	NO_3-N	PO_4-P	K	Zn	%	ppm	ppm
0-6 Inch Depth																
Conventional check	25.9	7.2	1.2	5.5	1.8 a	3.3	0.8 a	1.3	0.1	14.4 a	10.8	271	0.8	0.62 362	3.3	
Poultry manure (1995 & 1996)	26.6	7.1	1.5	7.2	2.6 b	4.0	1.4 b	1.4	0.1	19.3 b	14.9	338	1.1	0.65 299	3.6	
Compost (1995 & 1996)	26.3	7.2	1.4	6.8	2.4 b	3.7	1.3 b	1.3	0.1	15.7 a	12.9	337	1.0	0.65 379	3.9	
LSD (.05)	NS	NS	NS	NS	0.4 NS	0.3	--- ---	2.4	NS	NS NS	NS		NS	NS		
CV %	3.0	1.9	11.8	16.1	8.2 14.4	11.0	--- ---	6.5	13.4	159 11.2	10.5		15.5	18.4		
High compost rate	26.4	7.0	1.7	7.9	3.2 4.4	1.6	1.5 0.1	20.2	18.6	334 1.5	0.81	517	3.8			
6-18 Inch Depth																
Conventional check	26.6	7.5	0.9	4.2	1.3 3.2	0.4	1.6 0.1	10.4	8.0	196 0.5	0.36 ab	106	1.9			
Poultry manure (1995 & 1996)	25.9	7.4	1.1	4.8	1.6 4.0	0.7	2.1 0.1	13.3	12.2	242 0.6	0.31 a	173	2.1			
Compost (1995 & 1996)	26.8	7.4	1.2	5.4	1.8 4.4	0.7	2.3 0.1	14.9	8.9	285 0.6	0.43 b	162	2.8			
LSD (.05)	NS	NS	NS	NS	NS	NS	NS	---	---	NS	NS	NS	NS	0.07 NS	NS	
CV %	1.5	0.6	11.1	12.9	22.5 26.9	30.7	--- ---	12.9	22.4	19.7 12.7	8.5		54.2	40.2		
High compost rate (1996)	26.8	7.4	1.3	5.9	2.2 4.6	0.6	2.0 0.1	13.4	13.9	259 0.8	0.50	133	2.6			

[1]Soil samples were collected November 1, 1996. Values, with the exception of the high compost rate, are means of three replications with two composite samples per plot. The high compost rate of 20 dry tons per acre was applied on either side of the trial in 1997 and values, based on two replications, were not statistically analyzed. SP = saturation percentage; EC = electrical conductivity; ESP = exchangeable sodium percentage; LSD = least significant difference at the 5% level of probability; NS = not significant; CV = coefficient of variability.

Appendix D

Figure A. Tulare County Compost Demonstration Project Plot Plan

Location: South side of Avenue 192, between Road 140 & Road 152

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		REP I			REP II			REP III				
TREATMENTS: A. No organic material. B. Chicken manure @ 2.5 T/A dry weight in 1995; turkey manure @ 2.2 T/A dry weight in 1996. C. Composted grass clippings and landscape prunings ("green material") @ 3.5 T/A dry weight in 1995 and @ 3.9 T/A dry weight in 1996. D. Composted grass clippings @ 20.0 T/A dry weight in 1996.	20 tons/acre compost strip, 1996 only	no organic material ①	chicken manure ②	composted green material 48 rows ← 120' ③	chicken manure ④	no organic material ⑤	composted green material ⑥	chicken manure ⑦	no organic material ⑧	composted green material ⑨	20 tons/acre compost rate, 1996 only	→ 1300 feet →

Avenue 192

Appendix E

Local Compost Market Assessment

Summary of Survey of Compost Sales in Tulare County – 1994, 1995, 1996, and 1997

Compost producers were surveyed from 1994 through 1997 to determine which portion of their compost sales occurred within Tulare County. A total of 26 producers were surveyed.

A majority of the producers (22) did not represent any sales of compost within Tulare County. Of the four producers which did sell compost within Tulare County only two (New Era Farm Service and Tulare County Compost) had sales in the first year of the survey (1994). All four producers represented sales in survey years 1995 through 1997.

Three of the four producers reported an increase in compost sales from the beginning of the survey period (1994) to the end (1997). New Era Farm Service numbers indicated a decrease in sales. However, this is most likely due to the fact that the 1994 and 1995 figures were estimates and the 1996 figure is based on actual sales. It is highly possible that they overestimated sales in 1994 and 1995.

The largest increase in the sale of compost was seen by Tulare County Compost with 3,520 tons sold in 1994 and 12,000 tons sold in 1996 and a projected sale of 15,000 tons in 1997.

The data represented in the survey could suggest the increase in sales is attributable to an increased demand for compost through the efforts of this grant study. However, the increase in sales may also be attributed to increased marketing or advertising efforts by the individual producers, natural fluctuations in demand or other market conditions.

Of the four producers, only Tulare County Compost stated that the compost grant had a demonstrable positive effect on sales; the remainder stated the compost grant efforts had no discernible effect.

In summary, with the exception of Tulare County Compost, the observed increase in compost sales is not of sufficient quantity or duration to assert with any degree of certainty that the efforts of this grant study are the primary reason.

Survey of Compost Sales in Tulare County
1994, 1995, 1996, and 1997

ORGANIZATION	1994 *	1995 *	1996 *	1997 **
BTI	0	0	0	0
BAKERSFIELD COMPOSTING PROJECT	0	0	0	0
BROWNING-FERRIS INDUSTRIES	0	0	0	0
CALIFORNIA BIO-MASS	0	0	0	0
CITY OF FOLSOM, RECYCLING DIVISION	0	0	0	0
CITY OF SAN DIEGO, WASTE MGT DIV	0	0	0	0
COMMUNITY RECYCLING & RESOURCE	0	0	0	0
SAN DIEGO COUNTY, PUBLIC WORKS	0	0	0	0
EARTHWISE	0	1,000	1,000	1,400
ENGEL AND GRAY, INC.	0	0	0	0
FOSTER FARMS	0	0	0	0
GRO-RITE COMPANY	0	0	0	0
GUADALUPE LANDFILL	0	0	0	0
KELLOGG SUPPLY, INC.	0	0	0	0
NEW ERA FARM SERVICE	40,000 ***	40,000 ***	20,572	25,000
ORGANIC RECYCLING WEST	0	0	0	0
RECYC REGIONAL COMPOSTING	0	0	0	0
SAN JOAQUIN COMPOST	0	0	0	0
THE SCOTTS COMPANY	0	0	0	0
TULARE COUNTY COMPOST	3,520	4,800	12,000	15,000
VALLEY COMPOST AND TOPSOIL	0	0	0	0
WEAVER INDUSTRIES, INC.	0	1,500	3,000	3,000
WHITEFEATHER FARMS COMPOSTING	0	0	0	0
WOOD INDUSTRIES COMPANY	0	0	0	0
WOOD RECOVERY SYSTEMS	*SEE TULARE COUNTY COMPOST*			
ZANKER ROAD RESOURCES MGT	0	0	0	0
TOTAL	43,520 ****	47,300 ****	36,572	44,400

Figures are reported in tons-per-year.

NOTES:
- * Calendar year
- ** Projection through end of calendar year 1997
- *** Not based on actual sales
- **** Includes estimated sales from New Era Farm Service that based on actual sales were later determined to be high.

SOURCE: Tulare County Public Works
Solid Waste Division