

**ITEM 10.I.**

**MOORPARK CITY COUNCIL  
AGENDA REPORT**

**TO:** The Honorable City Council

**FROM:** Jeremy Laurentowski, Landscape/Parks Maintenance <sup>SL</sup>  
Superintendent

**DATE:** June 3, 2011 (CC Meeting of June 15, 2011)

**SUBJECT:** Consider Update on the Condition of the Coast Redwoods  
on Tierra Rejada Road and Arborist Report Prepared by  
Arbor Essence

**DISCUSSION**

Planned Community No. 3, also known as the Mountain Meadows Planned Community, was originally approved by the County of Ventura prior to the City's incorporation in 1983. The Mountain Meadows Community encompasses a major section of southern Moorpark and spans over 850 acres. The northern border is delineated by the Arroyo Simi, the southern border by Las Posas Hills, the western border by Home Acres, the eastern border by Peach Hill and the entire community is transected by the major arterial, Tierra Rejada Road. The planners and designers that developed the Tierra Rejada Road streetscape implemented a landscape concept that consisted of cool mountain forests, large evergreen and deciduous shade trees and rolling green meadows. Coast Redwoods (*Sequoia sempervirens*), European White Birch (*Betula pendula*), California Sycamore (*Platanus racemosa*) and a blanket of creeping red fescue (*Festuca rubra*) were utilized to enhance this vision and turn the Tierra Rejada Road corridor into one of the most enjoyed streetscapes in the City. Overtime, the Tierra Rejada Road streetscape concept was expanded and today includes a major portion of the arterial from approximately Country Wood Drive to South Hampton Road.

Over the years, many of the Coast Redwoods that were planted along the Tierra Rejada streetscape have slowly been in decline due to localized environmental stress conditions. Coast Redwoods are native to the coastal ranges and fog belt regions of northern California and southern Oregon. The coastal climate generally includes mild day time temperatures, rarely exceeding 75°F, long cool winters, a consistent marine influence and moderate to high annual rainfall. Coast Redwoods have been a popular landscape tree used by many landscape designers throughout the state of

California. However, many native plant species utilized for landscape purposes outside their natural range exhibit environmental stress conditions as climate, water availability and soil conditions typically do not provide optimum growing conditions required by these trees. Environmental stress eventually weakens their ability to resist disease and opens the door for pathogens and other plant disorders.

During the summer of 2010, the City of Moorpark experienced a heat wave with temperatures exceeding 112°F for several days. A combination of the high ambient heat with the reflective heat from the asphalt road surface caused many of the trees on the north side of Tierra Rejada Road to suffer from severe heat scorch. Heat scorch is a common occurrence that causes the tissue to dieback on many cool season plant species that are subject to high heat conditions. However, heat scorch typically does not cause a fatal condition on its own, but it opens the door for pathogens to infect the trees as they attempt to recover.

Towards the end of 2010, it became apparent that many of the Coast Redwoods on Tierra Rejada Road have suffered severe dieback on the crowns and limbs of these trees. During staff's initial investigations, there was some immediate response from the trees as new buds and leaf growth was evident. However, complete recovery from the heat scorch condition seemed to be much slower than anticipated. In March, 2011 staff contacted Arbor Essence to prepare an arborist report and inspect the trees for common pathogens and evaluate the physical site conditions of the Tierra Rejada Road corridor.

The arborist report confirms the presence of a fungal disease commonly called Sequoia canker. The canker disease is the result of the pathogen *Botryodiplodia* spp., a fungus that infects trees that are exposed to environmental stress or weakened by site conditions. Seasonal rain and wind is responsible for dispersing the fungal spores and infecting neighboring trees. Infection commonly occurs through wounds, such as cracks in the bark, sun scorch die back or other types of injured tissue.

According to the arborist report, *Botryodiplodia*-type fungi are the number one pathogen responsible for reducing the aesthetic qualities and life expectancy of redwoods planted outside their natural range. In addition, the current site conditions do not favor ideal growing conditions for these trees. The type of overhead irrigation systems is problematic as it saturates the trunks of the trees, the red fescue growing at the base of the trees should be removed to prevent potential root and crown rot diseases and the soil analysis identified significantly low levels of soil fertility in the common macronutrients (Nitrogen (N), Phosphorus (P), Potassium (K)) necessary for healthy plant growth.

Unfortunately at this time, a cure for this disease has not been identified. The only known cure is to remove the affected branches back to healthy tissue. There has been some suggestion that several common broad-spectrum applications may

provide some protection against new infections and help stop the spread of the fungal spores. However, the primary preventative procedure seems to be improving the overall health of the tree.

Based on the quantity of trees infected, removal of infected limbs through pruning procedures may not be a viable solution to this problem. In addition, many trees are so severely infected that removal is probably the only option at this time. It is likely that a prioritized replacement program will be necessary over the next several years.

Staff has contacted Arbor Essence and has scheduled a visual analysis of every Coast Redwood on Tierra Rejada Road to determine if removal is necessary or if recovery efforts are appropriate at this time. Staff will evaluate this data and prepare a long-term management plan and replacement plan if deemed appropriate, for all of Tierra Rejada Road at a future date.

### **FISCAL IMPACT**

Staff will evaluate the fiscal implications of a long term management plan and replacement plan at a future date.

### **STAFF RECOMMENDATION**

1. Review and File Report.

#### Attachments:

- I. Arborist Inspection Report – Arbor Essence
- II. Pathology Results and Soils Analysis – Soil and Plant Laboratory, Inc.

May 19, 2011

Mr. Jeremy Laurentowski  
City of Moorpark  
799 Moorpark Ave.  
Moorpark, CA 93021

Regarding: Inspection of Redwood trees  
Tierra Rejada Road  
Moorpark, CA

Dear Jeremy,

At your request I visited the above referenced site May 4, 2011. The purpose of this visit was to assess the current condition of a various coast redwood (*Sequoia sempervirens*) trees along Tierra Rejada Road that display severe signs of stress and decline.

The subject redwood trees have been struggling for several years but had a significant turn for the worst during a heat wave in 2010, several trees have also failed over the past few years. Past assessment/inspection by other arborist have only identified water deficit as the problem.

I was asked to perform a thorough assessment/evaluation of the current condition of the tree and site, including submittal of soil and plant tissue sample to a lab for analysis and pathology testing. The city would like to determine/diagnose specific cause for decline in the trees and or site/maintenance problems. I inspected two general areas where trees are in the worst condition, and for comparison, a couple areas where some appear to be in fair condition.

My visual inspection was performed from ground level. Binoculars were used to assess the trees higher up in the crown and a soil probe was used to check soil moisture to depths of approx. 2-3 feet. Plant tissue and soil samples were collected from two different trees/site locations and submitted to lab for analysis/testing.

The primary focus of my inspection took place in two areas, the first was a grouping of trees on the north side of Tierra Rejada east of Walnut Creek, and the second was a group of trees also on the north side of Tierra Rejada west of Walnut Creek. I also inspected various trees on the slope on the south side of Tierra Rejada.

### **Observations**

Several trees in the two primary areas inspected display severe stress and decline symptoms with heavy branch dieback, necrotic foliage and thin crowns. One interesting observation was that the south side of the trees displayed much more decline than the north side, which in some cases appeared quite healthy and green with little dieback. Trees on the south side of Tierra Rejada appear to be suffering considerably less than those on the north side. Most of the trees do display new shoot growth throughout their crowns, tissue in the root collar area appeared healthy, and healthy viable roots were observed in soil core samples.

Both areas that were inspected on the north side of Tierra Rejada were very similar in relation to decline symptoms and site conditions, one main difference was that the area west of Walnut Creek is being irrigated by rotary sprinklers and those to the east are being irrigated by shrub/turf sprinklers. It is apparent by bleaching on the lower trunk area that many trees are receiving overspray from nearby sprinklers. Ground cover (red fescue) and misc. shrubs are growing under the trees, in some instances the ground cover comes into direct contact with the trunk of the trees. The day on my inspection soil moisture was found to be near field capacity with some spotty dry areas. Soil moisture on slope trees was considerably drier.

### **Discussion**

Coast redwood trees are native to the Northern California coast and statistically do not thrive in hot dry Southern California valley climates. Some of the stress symptoms observed are considered normal for this climate. Decline symptoms observed are consistent with *Botryosphaeria* canker, and infection of the disease was confirmed in both samples from the lab. Control and potential treatments are outlined in the lab report.

Site conditions are not ideal for any species of tree. Field studies have shown that turf growing up to and in direct contact with the trunks of trees to have adverse effects on tree health. Although no signs of disease were observed in the root or root collar or the trees that were checked it is generally considered a poor practice to have surrounding sprinklers constantly wetting the trunks of trees as it can create an environment favorable to the development of root and crown rot diseases.

Soil texture is a clay loam and does not seem to be significantly compacted. Soil moisture around trees on the north side of Tierra Rejada was very high the day of my inspection but appropriate if not a static condition and the soil is allowed to dry slightly between waterings.

Although I did not observe any major signs of nutrient deficiencies in foliage color nutrient deficiencies can be a contributing factor in overall tree health and susceptibility to stress and disease. Lab results show significantly low levels of soil fertility in macronutrients (N,P,K), pH, salinity and micronutrient levels are acceptable.

I found it very interesting to see the difference in appearance on the north and south sides of the trees, the north side being much greener and far less affected from the canker disease. Based on my inspection and considering site conditions and exposure factors I believe that the south side of the trees is more affected due to exposure and reflected heat from the street.

One of the recommendations to help control the canker disease mentioned in the lab report is pruning to remove affected branches back to healthy tissue. Based on the quantity of plants this is probably not a reasonable option except in cases of minor infection. It may be appropriate to start considering a prioritized replacement program that would take place over the next several years; a new tree species would also be suggested.

### **Conclusion**

Several trees have been severely affected by the canker disease and cannot reasonably be restored to health, while many others may be salvageable by employing remedial pruning, fertilization, proper irrigation and modifying site conditions that will favor tree health.

I believe that all the factors discussed, maintenance, soil fertility, site conditions and climate, contributed to the decline and demise of several of the trees.

### **Recommendations**

- See lab report for specific recommendation on possible treatment and control of Botryosphaeria canker, and fertilization.

It should be noted that the study of trees is not an exact science and arboriculture does not detect or predict with any certainty. The arborist therefore is not responsible for tree defects or soil conditions that cannot be identified by a prudent and reasonable inspection.

If you have any questions or require other services please contact me at the number listed below.

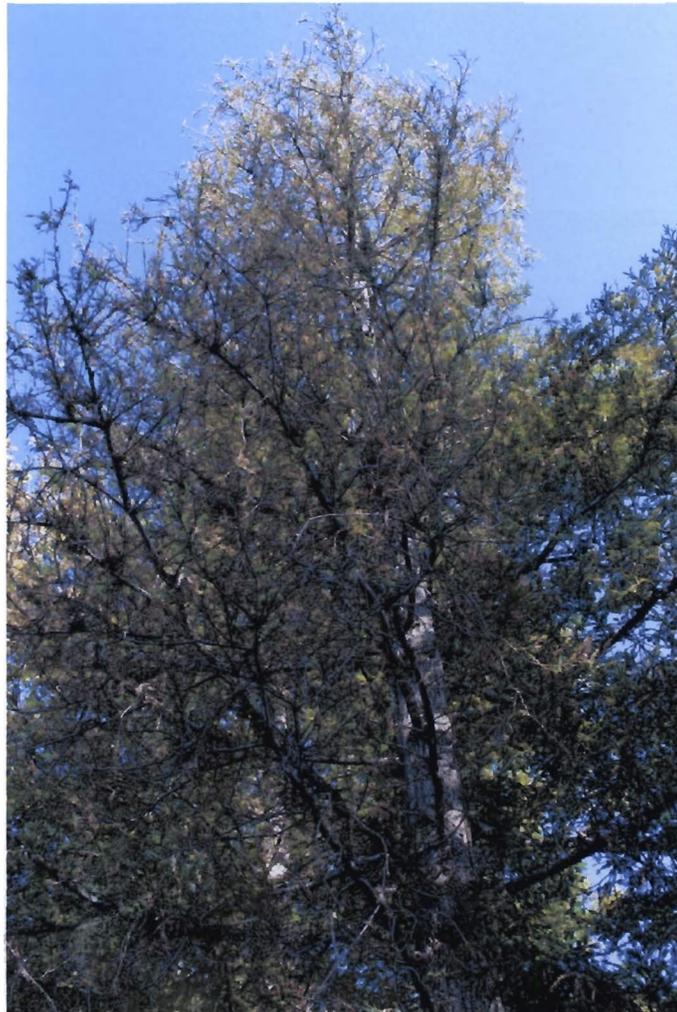
Respectfully,  
Arbor Essence

Kerry Norman  
ASCA, Registered Consulting Arborist #471  
ISA Board-Certified Master Arborist #WE-3643B

Tierra Rejada Redwood trees  
May 4, 2011



Trees on T.R. east of Walnut Creek  
Environment around trees



Decline symptoms

Tierra Rejada Redwood trees  
May 4, 2011



Decline symptoms, dead twigs/branches

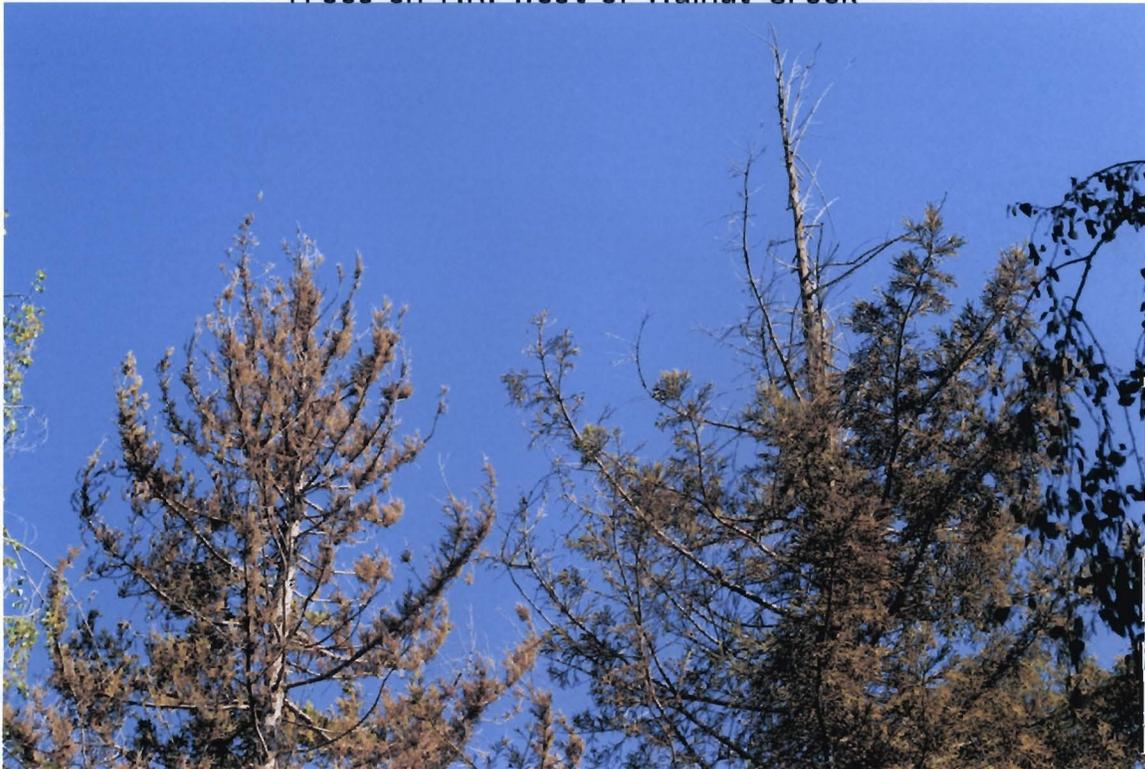


North 1/2 of tree looks healthy

Tierra Rejada Redwood trees  
May 4, 2011

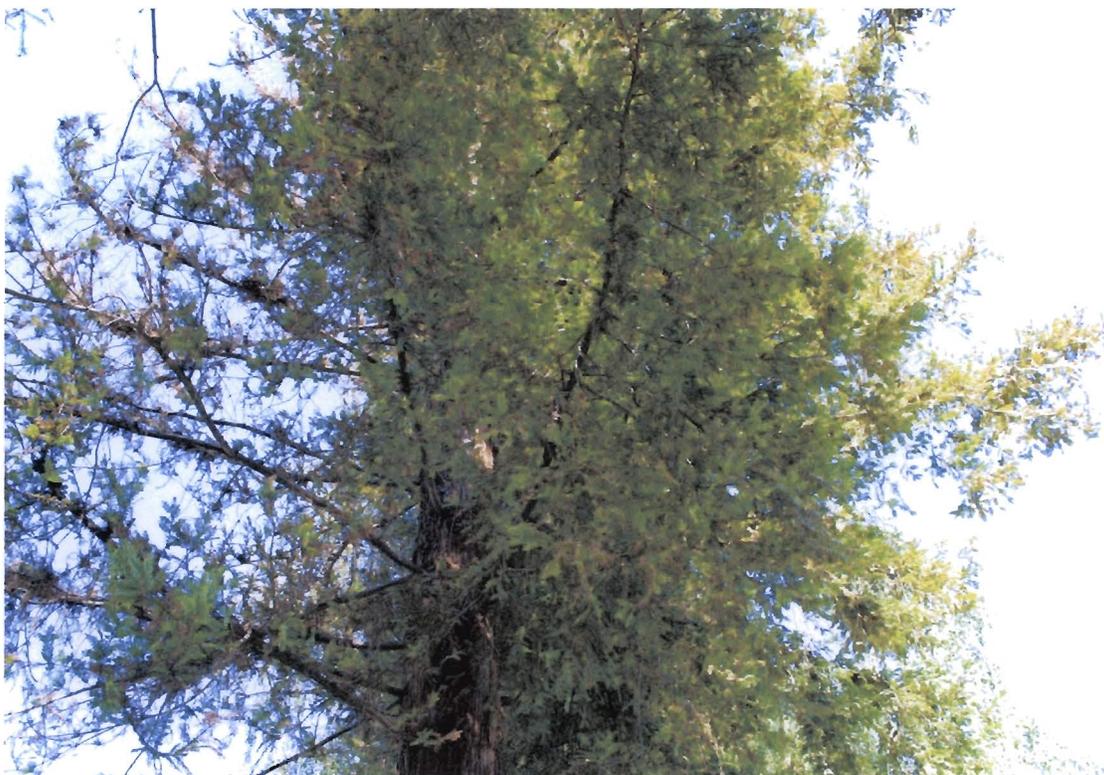


Trees on T.R. west of Walnut Creek

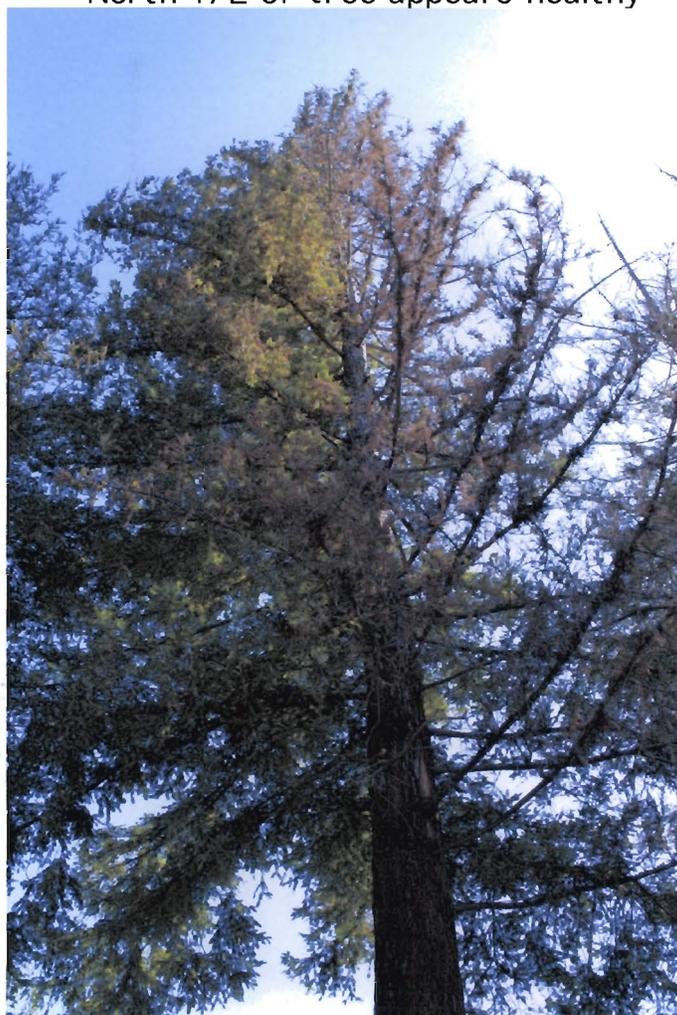


Tops of trees dead

Tierra Rejada Redwood trees  
May 4, 2011



North 1/2 of tree appears healthy



North 1/2 of tree less affected by  
disease



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San Jose, CA 95128  
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4741 E. Hunter Avenue  
Suite. A  
Anaheim, CA 92867  
(714) 282-8777

Anaheim Office  
Lab No. 11-124-0027  
Path No. 410  
May 19, 2011

Arbor Essence  
10523 Burbank Blvd. # 204  
North Hollywood, CA 91601

Attn: Kerry Norman

**PATHOLOGY RESULTS: REDWOOD – TIERRA REJADA, MOORPARK**

Provided here are the laboratory results of pathology work conducted on branch material collected from a pair of ailing redwoods (*Sequoia sempervirens*) and delivered to our laboratory on May 4. Plant material received was labeled 'N. side T.R. W. of Pheasant Run' and 'N. side T.R. E. of Walnut Creek.'

Tissue from the branches and browning leaves were examined under the microscope and cultured onto a series of agar media plates for pathogen detection.

Pathogens isolated: *Botryodiplodia* spp. (an imperfect state of *Botryosphaeria* spp.) was isolated from both sets of branch and needle tissue.

In addition to pathology testing of the received branch material, we also performed detailed chemical analysis on two soil samples collected from the two trees. The data sheets corresponding to the soil tests are included with the report.

**Soil Analysis Results**

The Pheasant Run and Walnut Creek soil samples are of similar chemical composition. Salinity in both cases is below 2.0 dS/m, which is ideal. The Pheasant Run soil has a pH that is slightly acid in reaction at 6.9, while that of Walnut Creek is neutral at 7.0 on the pH scale.

Fertility levels in both samples are low with respect to the macronutrients nitrogen, phosphorus, and potassium. Calcium supply is fair and magnesium ample. The micronutrient content of the Walnut Creek soil is slightly better than that of the Pheasant Run sample. Boron in both samples is safely low.

**Comments and Recommendations**

Based on the pathology results of the branch samples, it appears that *Botryodiplodia*, which is one several asexual states of *Botryosphaeria*, is a principal contributor to the poor condition of the redwoods.

As you well know, redwoods are a popular landscape tree in California. Unfortunately, what most of us do not realize is that climatic zones with predominately low relative humidity and high summer heat are stressful environments for these trees. It is this stress in particular that predisposes redwoods to opportunistic pathogens such as the *Botryosphaeria*-type fungi, which are the number one pathogens responsible for reducing the aesthetic qualities and life expectancy of redwoods planted outside their natural range.





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Arbor Essence  
May 19, 2011

Depending on the extent of injury to the crown, improving the health of the trees may or may not be feasible. Loss of more than a third of the central leader is often times cause for tree removal given the severe impact on tree structure and aesthetics. If however the damage is considered minor, then removal of infected branches well beyond any obvious internal discoloration can help rid the tree of the Botryosphaeria infection.

Fungicide applications, whether these be via injection or some other method of application, tend to provide poor curative control of this disease. That said, materials with broad-spectrum active ingredients such as tebuconazole, thiophanate-methyl, chlorothalonil, or azoxystrobin may provide some protection against new infections and may be considered when the tree is known to be under stress. Your preferred agrochemical supplier should be able to provide a specific product recommendation.

As already mentioned, stress is the number one reason why redwoods come down with Botryosphaeria canker. Thus while it may not be possible to eliminate all stress, there are some stress factors that can be addressed. Amongst these are: high salinity, alkaline soil conditions, compaction, competition with surrounding plants for resources, restricted volume of quality soil for expanded root growth, etc., some of which may be correctable.

Since several of the major nutrients are low, I would recommend fertilizing both trees with Apex 14-14-14 Landscape Color with micronutrients. Evenly broadcast the fertilizer under the dripline using a rate of 7 lbs. per 1000 sq. ft. and follow with a very thorough irrigation. In the fall apply sulfur-coated urea at 5 lbs. per 1000 sq. ft. and water in well.

Thinning out understory plants to reduce competition, ensuring irrigations are thorough enough to accomplish some leaching, do not lift the skirt of the tree, aerate the soil with a pneumatic air spade if compacted, and maintain a high quality layer of mulch (2-3 inches deep) over the soil surface, are just some general suggestions. I should point out that with respect to the thorough irrigations, time between irrigations should be long enough to allow the soil to dry out slightly otherwise the soil will stay too saturated which could then lead to a root rot problem.

Please call if you have any questions.

Paul F. Santos, M.S.  
Plant Pathologist  
Email: [kerry@arboessence.net](mailto:kerry@arboessence.net)





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## SOIL ANALYSIS

Send To : Arbor Essence 10523 Burbank Blvd #204 North Hollywood CA 91601	Project : TIERRA REJADA REDWOODS, MOORPAR	Report No : 11-124-0027 Cust No : 04873 Date Printed : 05/11/2011 Date Received : 05/04/2011 Page : 1 of 2 Lab Number : 11848
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Sample Id : **REDWOOD 1 PHEASANT RUN**

### SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth				
		Negligible	Sensitive Crops Restricted	Many Crops Restricted	Only Tolerant Crops Satisfactory	Few Crops Survive
Salinity (ECe)	1.5 dS/m					
Sodium Adsorption Ratio (SAR) *	2.6					
Boron (B)	0.30 ppm					
Sodium (Na)	5.4 meq/L					
Chloride (Cl)						
Carbonate (CO3)						
Bicarbonate (HCO3)						
Fluoride (F)						

\* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime
pH	6.9 s.u.								None

### EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS					NO3-N
			Very Low	Low	Medium	Optimum	Very High	
Available-N	12 ppm	0.4						2 ppm
Phosphorus (P) - Olsen	2 ppm	0.1						NH4-N
Potassium (K)	54 ppm	0.5						10 ppm
Potassium - sat. ext.	0.3 meq/L							Total Exchangeable Cations(TEC)
Calcium (Ca)	1138 ppm	0.8						87 meq/kg
Calcium - sat. ext.	4.7 meq/L							
Magnesium (Mg)	333 ppm	1.9						
Magnesium - sat. ext.	3.8 meq/L							
Copper (Cu)	0.5 ppm	0.5						
Zinc (Zn)	2 ppm	0.6						
Manganese (Mn)	3 ppm	0.3						
Iron (Fe)	11 ppm	0.3						
Boron (B) - sat. ext.	0.30 ppm	1.0						
Sulfate - sat. ext.	6.4 meq/L	2.1						
Exch Aluminum								

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

### PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Weight Percent of Sample Passing 2mm Screen							USDA Soil Classification
		Gravel		Sand			Silt	Clay	
		Coarse 5-12	Fine 2-5	Very Coarse 1-2	Coarse 0.5-1	Med. to Very Fine 0.05-0.5	.002-.05	0-.002	
15 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.



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## SOIL ANALYSIS

Send To : Arbor Essence 10523 Burbank Blvd #204 North Hollywood CA 91601	Project : TIERRA REJADA REDWOODS, MOORPAR	Report No : 11-124-0027 Cust No : 04873 Date Printed : 05/11/2011 Date Received : 05/04/2011 Page : 2 of 2 Lab Number : 11849
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Sample Id : **REDWOOD 2 WALNUT CREEK**

### SATURATION EXTRACT - PLANT SUITABILITY

Test	Result	Effect on Plant Growth				
		Negligible	Sensitive Crops Restricted	Many Crops Restricted	Only Tolerant Crops Satisfactory	Few Crops Survive
Salinity (ECe)	1.1 dS/m					
Sodium Adsorption Ratio (SAR) *	2.25					
Boron (B)	0.51 ppm					
Sodium (Na)	4.6 meq/L					
Chloride (Cl)						
Carbonate (CO3)						
Bicarbonate (HCO3)						
Fluoride (F)						

\* Structure and water infiltration of mineral soils potentially adversely affected at SAR values higher than 6.

Test	Result	Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Slightly Alkaline	Moderately Alkaline	Strongly Alkaline	Qualitative Lime	
pH	7.0 s.u.									None

### EXTRACTABLE NUTRIENTS

Test	Result	Sufficiency Factor	SOIL TEST RATINGS					NO3-N
			Very Low	Low	Medium	Optimum	Very High	
Available-N	6 ppm	0.2						2 ppm
Phosphorus (P) - Olsen	6 ppm	0.3						NH4-N
Potassium (K)	94 ppm	0.6						4 ppm
Potassium - sat. ext.	0.3 meq/L							Total Exchangeable Cations(TEC)
Calcium (Ca)	1453 ppm	0.7						
Calcium - sat. ext.	5.0 meq/L							120 meq/kg
Magnesium (Mg)	536 ppm	2.0						
Magnesium - sat. ext.	3.3 meq/L							
Copper (Cu)	1.1 ppm	0.7						
Zinc (Zn)	2 ppm	0.3						
Manganese (Mn)	9 ppm	0.7						
Iron (Fe)	44 ppm	0.7						
Boron (B) - sat. ext.	0.51 ppm	1.7						
Sulfate - sat. ext.	5.4 meq/L	1.8						
Exch Aluminum								

Cu, Zn, Mn and Fe were analyzed by DTPA extract.

### PARTICLE SIZE ANALYSIS

Half Sat	Organic Matter	Weight Percent of Sample Passing 2mm Screen							USDA Soil Classification
		Gravel		Sand			Silt	Clay	
		Coarse 5-12	Fine 2-5	Very Coarse 1-2	Coarse 0.5-1	Med. to Very Fine 0.05-0.5	.002-.05	0-.002	
19 %									

Graphical interpretation is a general guide. Optimum levels will vary by crop and objectives.