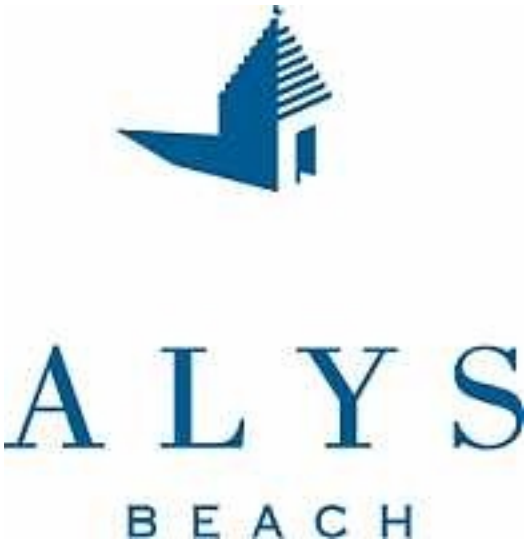

Palm Inspection Report

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I have inspected all of the palms on site and with the exception of the Medjools at the pool area, I feel that all of them are in generally good condition. Each group of palms is experiencing certain issues but so long as potentially damaging practices are discontinued, none of those issues represent a threat to the long term survival of the palms. I have detailed steps you can take that will engender more powerful aesthetics and will enable healthier palms that are more resistant to disease or environmental damage.

I have set forth my observations, opinions and recommendations. During your review and interpretation of this report, it is important to recognize that current symptoms are representative of an aggregate of the conditions & scenarios to which the palms have been exposed during the preceding months. Especially in the case of issues with the lowest fronds; what you see today is a result of what has been happening over an extended time frame as opposed to events and circumstances occurring during just the past few weeks. I am recommending simple steps for the maintenance contractor to take that will impact, over time, the issues identified.

Medjool Date Palms on 30A

Issues

1. Lower frond desiccation and loss
2. Advantageous rooting
3. Low grade infection by *Graphiola phoenicis*

Graphiola phoenicis on the frond from a Canary Island Date Palm. This disease is present on many of the Medjool's on 30a.

Overall, these Medjool's are basically healthy and there are no serious disease issues which are currently affecting them. These palms are demonstrating with drought induced issue characteristics; this is most obviously evident in the lowest fronds but is further demonstrated by the presence of a fungal pathogen called *Graphiola phoenicis.* Graphiola is an opportunistic fungal pathogen that is has no lethal potential but that results in various degrees of damage to the lower fronds. In our experience, heavy infestations are most always observed in situations where a consistently high degree of evaporation occurring under the fronds results in the maintenance of constantly moist conditions on the leaflets. Where it is observed in conditions other than these, it is a sign that the palms have weakened to some extent and the opportunistic nature of the disease allows it to establish and proliferate. The incidence of Graphiola in these palms is low grade indicating to me that its presence is a result of a general weakening (as opposed to having been induced by constant moisture on the leaflets) which I believe to be related to the affects of many months of drought conditions exasperated by a less than ideal irrigation scenario. The incidence of Graphiola in

these palms is not severe enough to account for the lower frond desiccation observed. Where Graphiola is in evidence, a simple spray procedure will eradicate it. Please refer to my recommendations below.

Where no other contributory cause is present, the loss of the lower fronds in this species usually occurs in scenarios where the palms do not possess sufficient moisture to support full plant functionality *AND* the entire canopy. In essence, the transference of moisture to the least essential portions of the palm (The oldest -lowest fronds) will diminish as the sources of fresh water diminish. The palm will naturally defend the process's of proliferation and new frond production where there is insufficient moisture to accomplish these while also maintaining full conduction throughout the entire canopy. The net result will be a reduction of moisture in the oldest fronds followed by the eventual sacrifice of those fronds. This eventuality is demonstrated first by an aggregating degree of apparent damage to the tips and leaflets that is specifically resultant from diminishing transpiration. Further, I noted that the maintenance contractor has been rather heavily fertilizing these palms in an attempt to revitalize these lower fronds. Though the effort is commendable, one of the effects has been an increase in the levels of chlorides that the palms must cleanse out via transpiration. This is the process by which palms naturally shed excess chlorides (amongst other things) and in my opinion, it has been inhibited by the lack of adequate fresh water. It is via transpiration that the fronds will cleanse excess chlorides and where the process is interdicted, those chlorides will build up initially causing damage at the point where the cuticle that protects the frond from environmental damage is thinnest which is at the tips of the leaflets.

Tip damage like this can be mitigated on this site by adding water.

Tip damage exasperates into full leaflet desiccation and will eventually result in the loss of the entire frond. Though it is true that certain diseases will also result in frond desiccation, I do not believe that to be the case here.

I understand that a choice was made at some point to eliminate the bubblers on these palms and that the palms sole source of irrigation water has been that which is derived from the turf heads. I understand that water restrictions may have instigated this choice. Having inspected the turf/sand layer around the rock beds the palms are planted in just after the irrigation cycle ran and I found that penetration is to about 4". I also found that in the area at the base of the palms (the rock beds), penetration was less than that. The primary root systems of these palms may extend as much as 6-8 feet into the ground on an irrigated site but the capillary system exists in the upper 24-36". Where the irrigation is not concentrated at the capillary system and where the amount of overspray from non dedicated sources is very low; the watering cycle must be augmented by regular rainfall. Where this is not happening (as had been the case for many months on this site) and where the primary root system cannot find a source of water deeper, it is not unusual to see the lower fronds begin to desiccate and it is also normal that an accelerated sacrifice of those fronds will occur This condition (low moisture) also translates into poor distribution of primary and minor elements into the fronds as is demonstrated in the lab work.

In my opinion, by re-activating the bubblers and then taking steps to slow evaporation of the moisture delivered, as new sets of developing fronds push the current (upper) sets further down those fronds will no longer demonstrate desiccation and the palm(s) will hold fuller canopies.

Further advantageous rooting development can be mitigated by sealing the trunk

Many of these palms have developed advantageous rooting. This phenomenon is also known as “air roots”. Advantageous rooting develops on many species of palms where the trunks are regularly moistened by irrigation overspray. This rooting is non-injurious and does not pose any long term health issues. Air rooting may be considered by some to be aesthetically displeasing and there is a simple procedure that can be undertaken to interdict further development of advantageous roots.

Recommendations

A. To best control Graphiola, trim off the lowest affected fronds and then perform foliar applications utilizing **Mancocide** at the label rates. When performing the applications be sure that you thoroughly wet canopy and all leaf surfaces, top and bottom. Repeat the application twice 30 days apart for a total of three applications.

B. trim and remove the lower 2 sets of fronds and remove all of the date stalks. In the future remove the date stalks during the first week of June.

C. Reactivate the bubblers and set them to run for 15 minutes daily during the coming 90 days. Thereafter, cut them back to 15 minutes every other day.

D. Clean out all of the rock from around the bases of the palms, affix a layer of permeable ground cloth and then replace the rock. This will slow evaporation from the rooting zone and help you properly irrigate the palms during times of drought.

E. Treat the lower sections of trunk (from 5' down to ground level) with the water soluble type of Thompsons water seal (TWS). Be very careful to use the TWS that allows you to clean up your application tools or brushes with water; do not use the mix that requires you to use paint thinner to clean application tools. Apply TWS full strength to the trunks every 4 months. Doing so will inhibit further advantageous (air) root development.

F. Fertilize quarterly using a 12-5-12 with minors that is at least 50% slow release at a rate of 5 pounds per palm. Scatter the fertilizer across the entire surface of the rooting zone.

Canary Island Date Palms installed around the amphitheater.

This frond is demonstrating with nutritional deficiencies, *Graphiola phoenicis* and skeltonizer insects. The incidence of all three under these site conditions is not normal nor is it being induced by the cultural conditions onsite.

Issues

1. The palms appear to be nutritionally deficient and do not appear to be thriving onsite.

2. General weakness is demonstrated by apparent nutritional deficiencies, the presence of a

medium grade Graphiola infection and by the presence of colonizing opportunistic insects. This combination of issues is occurring under cultural circumstances that do not normally induce their establishment.

All of these palms appear to be surviving but they are not thriving as they should be. Based upon the aggregate of my observations, I believe that the entire group may be suffering the effects of a mild degree of Glyphosate shock. The palms are demonstrating what appear to be nutritional deficiencies in the oldest and mid tier fronds, they are demonstrating with fairly significant secondary (opportunistic) insect infestations in the leaflets and they are universally afflicted by a medium grade *Graphiola phoenicis* infection.

The blackening of these capillary root tips was probably caused by an herbicide application.

My inspection of the site conditions revealed that no circumstances that would normally induce Graphiola infection are present and in fact these site conditions should inhibit its development. In addition to this are apparent nutritional deficiencies in the lower and mid tier sets of fronds and the presence of a significant population of insects colonizing on the lower fronds. The insects were identified as being Frond skeletonizers and are known to be primarily opportunistic. Spraying these out is a simple procedure but doing so does not address the reason they are present. I have considered everything and feel that the sum of the symptoms viewed in conjunction with the site/cultural circumstances indicates that a generally acting element is inhibiting plant functionality. A portion of the issues could be explained by effects of the drought conditions these palms endured for so many months but these appear to have been better irrigated than the Medjool's on 30A and so I am disinclined to believe that all of these issues could be attributable to that cause.

While pondering the circumstances I inspected the capillary roots visible at the bases of these palms. This species produces a capillary root system soon after transplant. This capillary system develops from the upper 18-20” of the original root ball and the root tips commonly grow up and break the surface of the sand/soil at the base of the palm. My inspection revealed damaged root tips at the surface of the sand that my experience tells me are demonstrating with the effects of having come into contact with Round up (Glyphosate). After this observation and then weighing in all of the symptoms I am seeing in the palms, I hypothesize that applications of Round-up have been performed at the bases of these palms and that the chemical has come into direct contact with the capillary root system.

Glyphosate interdicts the plants ability to produce and utilize enzymes. This action will kill a small plant and if the rate applied is high enough and/or there are a substantial enough amount of above ground capillary roots, it will kill a date palm. We have seen losses attributable to Round up poisoning occur on other sites and have verified that Glyphosate was present in the terminal bud tissue 20 feet or more above ground level in those cases. With the palms at the amphitheater, I do not believe that there has been sufficient exposure to kill the palms but where Glyphosate is applied at a lower rate and/or where a lessor quantity of capillary roots is exposed to direct contact with the chemical, the initial demonstration will be an apparent general weakening and the appearance of nutritional deficiency. My hypothesis is further supported by the presence of a mid-grade Graphiola infection under cultural conditions that would not normally engender the proliferation of this disease and by the presence of colonizing insects on the leaflets that do not normally colonize *to this extent* in otherwise healthy Canariensis.

I am convinced that an herbicide was the cause of the weakness in these palms and after speaking with the maintenance contractor I believe that herbicide to have been Round up. Unfortunately, there is no way the maintenance contractor could have possibly known of the risk Round up poses to these palms because its label is devoid of warnings regarding this and other species it may harm via its introduction to exposed roots. I have provided further information as well as conclusions based upon my personal experiences re: Glyphosate issues on the attached page. Long story short, *do not allow the use of Round up or any other herbicide around the bases of your date palms.*

In my opinion, the damage done will cure itself with time provided no further applications are performed. I believe the palms have been spared the lion’s share of any potential damage because the capillary systems were not aggressive in forming extensively above the sand layer. The sand layer protected a portion of the capillary system from herbicide intrusion and so the palms were rendered only partially dysfunctional as opposed to something far worse than that.

Recommendations

A. Trim off lowest two sets of fronds.

B. Spray canopies with a combination of **Sevin, Dipel and Mancocide** at label rates. Repeat the application twice 30 days apart for a total of three applications. The Sevin and Dipel will take care of the insects and the Mancocide will take care of the Graphiola.

C. On a monthly schedule, thoroughly spray/drench the entire canopy using a liquid feed combination of Magnesium and Potassium. We use Phlex-Mag for the magnesium and Power Plant 0-0-22 for the potassium. These products are actually labeled for use in turf grass but they work superbly well on our palms. Using these particular products, we apply them at a rate of 1 gallon Potassium and 1 gallon Magnesium mix in 50 gallons of water. Mix thoroughly before applying. Perform these apps once a month for 6 months and then bi monthly thereafter. This feed does not need to be broken down by the plant and is instantly available. repeated applications will have a noteworthy affect on these canopies.

D. Discontinue the use of any herbicide within 5 feet of the bases of these palms and around any other date palms (Canariensis or Dactylifera or Sylvestris) on site.

E. During the treatment cycle, irrigate the palms once daily for 15 minutes. After the treatment cycle, adjust to every other day for 10 minutes to achieve a wet to dry cycle in the root zone.

F. Fertilize quarterly using 12-5-12 with minors that is at least 50% slow release at a rate of 5 pounds per palm. Scatter the fertilizer across the entire surface of the rooting zone.

Medjool Date Palms installed at the Pool area.

Issues

1. Poor canopy development
2. Significant nutritional deficiencies and failing conduction in the lower & mid tier fronds.
3. Medium grade *Graphiola phoenicis* infection.
4. Apparent general plant dysfunctionality

The Medjool's at the pool area have suffered damage to the root systems and are demonstrating with a range of issues.

These palms are in a generally weakened state and are not functioning properly. I took frond & root samples and submitted them for disease analysis. Other than a confirmation of Graphiola, no primary pathogens were identified. I believe that the cultural and irrigation scenarios combined with an aggregating degree of contamination in the beds has caused significant damage to the root systems of these palms. Upon inspection we found that the irrigation main line that services these beds was broken under the concrete decking. I do not know when this might have occurred but it has limited the amount of fresh water reaching the root systems. In addition to this, it was apparent that pool water run-off into

these beds subjects the root system to continuous exposure to damaging chemicals and/or excessive salts. I believe the chemicals to be bleach or other deck cleaning products and chlorine & acid from the pool. It is likely that while the pool was maintained as a salt water pool, high levels of soluble chlorides intruded into the beds during overflows and that now that the pool is maintained by chlorine & acid, those chemicals are adding to the issues. Limited fresh water combined with the tight nature of the beds (heavily congested with the root systems of the palms) has inhibited an effective leaching out of these contaminants and has resulted in aggregating levels and poor aeration. The net result is a real mess that needs to be addressed if the root systems are to be returned to good functionality and the palms returned to good health.

Recommendations

1. Create a low barrier around each bed that stops pool water from intruding. You must create a means by which contaminants are no longer able to enter these beds. The lab work demonstrates high calcium levels and medium sodium but a low Ph in the soil; conditions that tend to oppose each other. This supports my belief that salts had intruded into and congregated in the beds and then have been countered by acids from the pool.

2. Repair the irrigation system and then check that all of the bubblers in the beds are functioning. Run the irrigation for 20 minutes daily for a period of 10 days before proceeding to the root pruning (3 below) step. Continue to run the system on the 20 minute schedule for 30 days after root pruning and then cut it back to 10 minutes every other day to establish and maintain a wet to dry cycle in the root zone.

3. Trim off the three lowest sets of fronds. I know that the palms will be much thinner when you do this but it needs to happen. Once the new root system has begun regeneration and with the added boost the palms will receive because of the liquid feeds (#5 below) the canopies will grow out fairly rapidly.

4. Perform foliar applications utilizing **Mancocide** at the label rates. When performing the applications be sure that you thoroughly wet the canopy and all leaf surfaces top and bottom. Repeat the application twice 30 days apart for a total of three applications.

5. You need to partially root prune these palms. You can accomplish that via many methods but the goal is to sever a portion of the existing root system down to a depth of 12 inches. One method would have you using a heavy steel breaker bar with a sharp flat edge to perforate the root systems (and the beds) and in another you might use a weighted sharpened spade to make the cuts. The idea to sever approximately **35%** of the existing capillary system. 35% = **do not** cut a continuous line all the way around the entire circumference of the palm, just make individual cuts **at least 12" out** from the trunk in various locations around the base and to a **depth of 12"** without removing any of the soil. Make the cuts and remove the tool, no soil removal, no trenches cut, nothing like that; just make the cuts straight down. This work will partially root prune the palms and will aerate the tops of the capillary systems. Root pruning will incite regeneration of new, clean capillaries that are fully functional. This step is very important; it must be properly accomplished to be effective and its effectiveness is an essential step toward fixing

these palms. The watering schedule must be closely adhered to after root pruning; once the root pruning is completed, sufficient water must be readily available to allow for prompt root regeneration.

6. *Immediately* after root pruning perform a soil drench using Superthrive (www.superthrive.com) at a rate of 1 ounce in 5 gallons of water. This too is a very important step.

7. On a monthly schedule, thoroughly spray/drench the entire canopy using a liquid feed combination of Magnesium and Potassium. In this instance as with the Canariensis at the amphitheater, I recommend that you use Phlex-Mag for the magnesium and Power Plant 0-0-22 for the potassium. Use the same application rate as with the Canariensis. Mix thoroughly before applying. Perform these apps once a month for 6 months. Because this feed does not need to be broken down by the plant, its utilization will not be affected by dysfunctionality in the root systems and the repeated applications will have a noteworthy impact effect on these palms. ** **Be sure to wet the deck with water before applying this and be sure to have a man on a hose rinsing the deck as you go along. These products do not have any iron in them but they do contain minor elements and so staining is a slight possibility if you allow the product to dry on the deck.**

8. 60 days after the root pruning has been completed, fertilize the palms using a 12-5-12 with minors that is at least 50% slow release at a rate of 2 pounds per palm. Scatter the fertilizer across the entire surface of the rooting zone.

9. 60 days after the fertilization in (7) above, fertilize again using the same mix but up the rate to 4 pounds per palm. At this point the palms are ready to transition to a normal quarterly fertilization schedule. Because these palms are planted in confined beds, you will stay with 4 pounds per palm as opposed to the 5 pounds per palm recommended for the Medjool's on 30a.

If any party has questions or requires clarification on any point, please email me at GPN@datepalm.com. I appreciate this opportunity to serve you.

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