

Managing Scale Insects in Difficult Plants

I wrote about scale issues here at Waverly Farm in 2009. At least some of you were not in the industry at that time so a 12 year review is appropriate. We have learned much from our experiences and this information may be useful to you. I deliver this information as a 'grower', not a scientist or IPM expert. Thus, my views may be a bit skewed toward pragmatic business success.

Our annual intensive scouting concern relates to Camelia Taxus Scale (CTS), Japanese Maple Scale (JMS), Prunicola Scale, Lecanium Scale, and to a lesser degree Fletcher's Scale and a few more. Interestingly, we found CTS on Taxus for the first time ever this year. It must have been in Taxus last year but not discovered.

If a nursery person tells you, he or she has no scale problems, they are lying, stupid, or just do not want to deal with it. The classic claim is, "I can not have Japanese Maple Scale because I do not grow Japanese Maples". Unfortunately, there are about 30 JMS host plants; not just Japanese Maples.

I recently read on a very reputable nursery's website they cannot guarantee to ship plants without pest problems. An interesting admission we should all consider.

When IGR's (insect growth regulators such as Talus and Distance) became available, the word was we should be pleased with 80% control. With scale, 80% could never be a success. I now believe we can expect close to 100% control if the materials are applied at precisely the right time with appropriate equipment. It is not easy.

In the old days, we were taught to deliver atomized sprays at 40-80 gallons per acre (GPA). Those numbers ignore what is being sprayed and what type of equipment is used. I now deliver 200 GPA to more open canopies such as Cornus and 400 GPA to dense plants such as Ilex, Arborvitae, deciduous Magnolia, Taxus and more. This is not just guessing; we have confirmed using spray indicator cards the volumes needed for full coverage. This goes for dormant oil also. The current Talus label says to apply with sufficient water to achieve uniform coverage

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Taxus- Camelia Scale or Camelia-Taxus Scale



Japanese Maple Scale

IT'S TIME FOR SHARING (Continued)

of all stems and undersides of leaves. What that means is you must figure out the correct amount of water based on your equipment, tractor speed, and plant type. Use of spray indicator cards is the only way one can judge success.

There are nursery operations that do not think they have scale issues. It is highly likely they are wrong.

This is so because some scales like to hide from view, can occur in low numbers, and in the case of Japanese maple scale, can at first glance look like lenticels on some plants. If a nursery is located adjacent to a woods, scout for JMS in the woods. Scales can move on the wind from origin plants to others. Helicopter applications can be useful in wooded areas.

How did we get here?

I believe and have heard this from others we have gotten lazy about dormant oil and summer oil treatments. Here we use dormant oil annually during the dormant season and still see scale occasionally. I prefer to pass on summer oil because we will be using an IGR during that period. Oil can prove an effective general suppression management technique when low numbers of scale are present. However, oil is not the 100% cure. Some years it is difficult to apply oil before foliage because either the wind prohibits spraying or temperatures are predicted to fall below 50 degrees F. Low temperatures will interfere with the emulsifiers used in the oil.

There is also the notion that if Mother Nature is left to her own devices, sufficient predator populations will miraculously appear to manage the scales for us. This may be a practical outcome in the landscape where plant diversity is more the norm. When nurseries grow the same species in huge numbers all within eyesight, scales have the perfect environment to procreate beyond the ability of predators to contain them.

If we follow IPM strategies 100%, we will not treat for scales until the population grows sufficiently to cause economic damage. This policy works with many pests but not scale. Once scales become present, they will grow exponentially in one year.

On many occasions over the years, I have found only one

plant in a 500 foot row with scale. One would think that is not a problem. In a year or two there will be a trail of scale on plants downwind from the origin plant. Further, if you find one plant with scale, you likely missed others.

In 2021 we shipped over 1,000 large Hibiscus of various cultivars. A particularly good customer sent a picture of one plant he received that had scale on it. I scouted every block of Hibiscus from which we dug plants this spring and could not find another infection. Dealing with scale insects is really hard work.

Become Proficient at Identifying Scale Insects

The first thing you need is an inexpensive microscope. This year I replaced my 40 year old scope and came into the modern age. The old scope works well but I tire of looking through the binoculars. My new scope incorporates a small pad display that provides a very wide view. The model I bought is shown below at about \$200 on Amazon.

You will also need an inexpensive dissecting kit to pry open scale covers. This is useful to determine if crawlers actually exist. Scale covers will remain on the plant for



TOMLOV 8.5" Digital Microscope 50X-1300X Soldering Microscope, UHD Video Microscope with 12MP Ultra-Precise Camera Sensor for Adults, SD Card Included

up to 3 years. You need to know if a scale is empty or brimming with immature crawlers. The real goal to target a spray date is to find active crawlers. This requires intensive staring in the vicinity of a scale cover. They are tiny and may not be moving; wait for movement to confirm their presence. Generally, we wait 10-14 days after the first sighting to spray insuring most of the crawlers are out.

The need to own a microscope is to first identify what scale you have and then to find active crawlers to determine the spray date. During the months of April through November I almost daily bring in something to look at under the scope. I also keep the IPM Pest Predictive Guide on my computer desktop to follow along with growing degree days to predict when scale crawlers may immerge. (Pest-Predictive Calendar | University of Maryland Extension.) The calendar is a guide and crawler activity may occur before or after the degree day listed. The last thing we want to do is spray \$114 per pound material when the crawlers are not out.

Tough Plants to Cure of Scale

At Waverly Farm, 20% of our field production involves many genera, species, and cultivars of Ilex. They along with other dense plant habits such as Taxus, Arborvitae, and others provide a challenge to penetrate the foliage to contact the scale. Ilex becomes infected with TCS from



Lecanium Scale

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the bottom up. Penetrating the lower region of holly when planted in the block format is hard.

Label Confusion

I have been working with pesticides since 1970. I have attended an unknown number of pesticide use lectures and conferences. On June 21, 2009, I was informed that in the case of horticultural pesticide labels, the rate per acre may not be the rate per acre. Pay attention here. Look at any label for spraying a pesticide on trees, for example, and the rate of application will be given in concentration - unit of measure per 100 gallons, or unit of measure per acre. **THEY DON'T MEAN LAND AREA ACRE!** They mean area of canopy treated. Pay attention. For example, the surface area of a 4 foot tall holly that is 4 feet wide is 62 square feet. An acre is 43,560 square feet. Therefore, we can treat 702 hollies of this size with the specified amount of material prescribed for an acre without violating the label. If those hollies are planted in a 5' x 5' grid pattern, there will be 1742 plants per acre. We would then apply enough material to cover 2.5 land area acres on this one acre of land area planting. What is going on?

I am told manufacturers have kept rates in the land mass acre format because they either would not be able to explain it to the U. S. Environmental Protection Agency or EPA would not permit the volume of chemical required per land area acre (in the above case, 2 1/2 times the amount specified on the label 'per acre'). This matter came up while trying to calculate chemical rates for handgun spraying during discussions with a manufacturer. Dr. David Ross, UMD, told me in the early 70's when pesticide licensing came into being he taught the canopy area calculation, but the discussion point has disappeared over time.

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IT'S TIME FOR SHARING (Continued)



Cima atomizing sprayer DOES NOT achieve complete coverage



Jacto cannon-type sprayer works well with multiple passes in block planting scheme but will not penetrate the bottom of the plant in the outside row.

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CIMA with lower cannons only to penetrate the outside row

As described below our treatment method has evolved over time using two different sprayers.

Scale Control Systems

Moderate air flow atomizing sprayer (70 MPH wind speed)

We have done extensive testing with our Cima sprayer and determined it would not be able to penetrate dense holly canopies as configured by the manufacturer. Subsequently, with some modifications to the air delivery system we determined that modest penetration can be accomplished, but not enough. The photo above might suggest good coverage. In dense canopy plants, some hydraulic sprayers have a tough time putting the pesticide

on the target. We buried spray indicator cards in the plants to assess results. The Cima sprayer utilizes a 70 mph air stream to carry the pesticide into the plant. We increased the air volume by plugging the discharge ports on one side of the machine and using only one of the top outlets on the functioning side, but we were still not satisfied.

High air flow cannon-type atomizing sprayer (180 MPH wind speed)

It was determined we should research a different sprayer to see if one existed that could perform better than our Cima. Based on discussions with growers in Maryland and Pennsylvania, we arranged for a demonstration of

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IT'S TIME FOR SHARING (Continued)

a JACTO sprayer made in Brazil. The JACTO model we demonstrated, and bought, has an air stream of 180 mph to carry the pesticide. After much testing with water only, we confirmed good penetration of 'Blue Princess' holly. Success came when we targeted each plant row on both sides from opposite directions. A four row block requires six passes. But wait! We still cannot adequately treat the outside row from the grass strip. This requires a separate trip with the CIMA using only the lower cannons. See photo on page 17.

Soil injection of systemic materials

We did this experimentally to 8' Magnolia 'Ann' and achieved 100% control with Safari (dinotefuran) at a cost of about \$15 per plant. The efficacy of systemic materials is well known and may be the best choice in the landscape. However, it is cost prohibitive in large scale field nursery production.

It is also possible to inject the chemicals for systemic control through a drip irrigation system. We experimented with drip applied Imidacloprid for boxwood leaf miner and



Treating a five row block of 'Blue Princess' holly for Taxus/Camellia scale with two different nozzle configurations and various hovering techniques was ineffective.

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Just a pretty picture from above — hard to believe those little rascals are hiding down there.



Treating 10' arborvitae for Fletcher's scale proved effective as is seen by the blue water stain pattern on the spray indicator card buried deep in the base of the plant.

“We spent several hours spraying just water with spray indicator cards located deep in various plants. Different nozzles and heights for spraying were employed.”

IT'S TIME FOR SHARING (Continued)

achieved particularly good control on two sides of the plant in line with the drip tube. Plants and their roots are 'geographic'. That is the roots on one side support the plant on that side generally. Root feeder injection on 4 sides gave us 100% control.

Aerial treatment

During the third week of June, 2009 (scale crawlers were detected here on June 19 that year) we hired a helicopter service, shown in the photo on page 18, to determine the efficacy of aerial application in various canopies. We spent several hours spraying just water with spray indicator cards located deep in various plants. Different nozzles and different heights for spraying were employed.

Ground treatment with handguns

In 2009 we determined scale infestations were increasing and control measures were needed immediately. Due to treatment timing requirements we had to react quickly. When it was determined that aerial application was not effective on dense broadleaf plants, and that timely application was of paramount importance, we hand sprayed various blocks of plants for Taxus/Camellia scale problems. Ultimately, we perfected machine praying and continue to be successful 'managing' scale insects today.

Summary

Scale insects are here to stay; there may be an ebb and flow over time. For the present, we are faced with intense and costly control measures. The average consumer, landscape contractor, rewholesaler, and retailer have no idea what we go through to provide high value plants.

The name of the game for now is extreme scouting; locate even small infestations and manage them aggressively. Much more information is available in the weekly IPM reports and numerous publications from the University of Maryland Extension office. ✦



Treating a dense stand of dogwoods for Japanese maple scale proved exceptionally effective.



Hand spraying is expensive and tedious but provides excellent coverage.



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