Newbie question about spray concentrations

Posted by Nathaniel Bouman
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Nathaniel Bouman
Newbie question about spray concentrations
March 10, 2016 08:26PM
Registered: 9 years ago
Posts: 81

Hi All,
Ok, dumb question, but here it goes. I hear a common application rate is 100 gallons per acre, so 2 gallons of X per acre yields about a 2% concentration. If' I'm correct so far, then if you've got 4 acres then you'd need 8 gallons of X to cover your orchard at the 2% concentration. Last season my newly planted orchard of 520 trees spaced 18'x24' only needed about 70-90 gallons for all 4.6 acres (even getting to the point of run-off). Let's say it takes 100 gallons to cover the orchard this year--that means I'd need 2 gallons of X to cover my orchard, not the 9.2 gallons I would calculate using the per acre rate. Does this make sense?

A follow up: if growers have different size trees and different spacing, why is it so common to encounter per/acre application rates? Wouldn't it be simpler just to see application concentrations in terms of how much product per gallon of water?

Nat Bouman
Growing cider varieties in Zone 5b
On B.118 at 18X24
Susquehanna County, Pennsylvania
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Mike Biltonen
Re: Newbie question about spray concentrations
March 10, 2016 09:19PM
Registered: 11 years ago
Posts: 298

Your first step is always to determine your tree row volume (TRV). The common wisdom (and reasonable rule of thumb) is that a fully grown semi-dwarf orchard is about 300 gallons dilute (or 300 gallons of spray per acre to run-off) - but you rarely ever need that much water. To start, divide the sq ft in an acre (43560) by the between row distance. That will give you the number of linear ft per acre. Multiply that by the current width and height of the trees. That will give you the total canopy volume (cu ft) of the orchard at full leaf. Divide that by 1000 and you get the full dilute spray volume for your orchard at that point in time. Early in the season you want to multiply by a stage of growth factor (SOGF) - first spray you should multiply by 0.7. So...43560/24=1815 ln ft per acre. 1815 x 8 x 8 = 116160 cu ft. 116160/1000=116.2 gal per acre full dilute. 116.2*.7=81.34 gallons per acre early season. 520 tree @ 18x24 = 5.3 acres x 81.34 = 431.1 gallons total. You didn't state the height or width of the trees, so I just assumed -- you can replace my numbers with the actual and redo the math. At some point if the trees are too small or too young, you'll need to make different assumptions, but this is the process you should use. Reference to 2% is always a volume/volume basis (as you stated), but it is per 100 gallons of water, not acre. So you always calculate based on the total volume of water in your tank (divided by 100) and go from there. In this case above, 431 gallons H2O x 0.02 (2%) = 8.62 gallons of material. 1% would be half that, 3% 150% of that. Hope that all makes sense.

Mike Biltonen, Know Your Roots
Zone 5b in New York
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Nathaniel Bouman
Re: Newbie question about spray concentrations
March 11, 2016 05:35AM
Registered: 9 years ago
Posts: 81

Thanks, Mike. I just made an excel sheet for the formula you provided. It works really well. It confirmed my experience and will help me predict spray volumes. The only part of the math that I don't exactly follow is when you divide the total canopy volume by 1000--oh wait, I guess that means that 1 gallon will cover 1000 cu. ft of canopy?

Nat Bouman
Growing cider varieties in Zone 5b
On B.118 at 18X24
Susquehanna County, Pennsylvania
Reply Quote

Mike Biltonen
Re: Newbie question about spray concentrations
March 11, 2016 06:48AM
Registered: 11 years ago
Posts: 298

Generally speaking, yes.

Mike Biltonen, Know Your Roots
Zone 5b in New York
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Michael Phillips
Re: Newbie question about spray concentrations
March 13, 2016 02:53PM

Moderator
Registered: 11 years ago
Posts: 621

The way to think about rates can be slightly different for those spraying to the "point of runoff" with biological and nutritional materials. Tree row volume is more of a construct for air blast application of toxic chemicals ... but certainly has a place in organic orcharding when you're getting a handle on how much volume it takes to cover the orchard system you've planted. Eventually you "sort of know" that it takes a 100 gallons or a 150 gallons or 200 gallons to get proper coverage of the material being applied. This shifts as well for those sprays directed more so at ground and trunk structure than the foliar canopy.

The books and the website provide various rates like 4 gallons liquid fish for ground application, 2 gallons liquid fish in canopy. The word "about" is appropriate in talking rates for fish, seaweed, microbes, and fermented plant extracts. Those using micronized sulfur should be thinking 8 lbs actual sulfur per acre for a major wetting event (which often translates into 10 lbs product as Microsulf etc. is often 82% actual sulfur). Still, no harm done if it turns out you need 80 or 120 gallons of spray per acre at a given point in the season ... this will turn out to be effective for the purpose. But if big trees require 200 gallons of spray, say, then the 10 lbs of product becomes 5 lbs per 100 gallons on that big-tree-acre. Surround clay is about the whiteness on the leaf so the rate you apply that works in your spray rig can be anywhere between 20 to 50 pounds per hundred gallons ... it's more a question of double application to get proper whiteness than some official rate.

Now let's spend some real money. Spinosad (Entrust) costs $400 and up for a quart of product. I apply this at 8 ounces per acre for the sawfly/curculio moment about a week after petal fall ... and am quite conscious to make the hundred gallon spray mix per acre extend to the last tree in the acre on that application. Neem oil is slightly different but it's costs adds up too. Here's it's about "effective concentration" that gets the job done but does not burn the leaf. Half a gallon per hundred keeps things safe but at the same time if it takes 120 gallons of spray to fully cover an acre this hasn't busted the budget. And with those up and coming trees of yours, Nathaniel, sure, maybe that hundred gallon tank does cover two plus acres right now. What counts is that the rate in the "radius of application" is acreage based only now applied to smaller square footage on two acres worth of ground.

Eventually we each know what it takes with different size trees and spacing at a particular point in the season. The "hundred gallons per acre" approach lends itself mostly to the things I do here in Lost Nation with a hand held spray gun averaged across the season.

Lost Nation Orchard
Zone 4b in New Hampshire
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Tim Bates
Re: Newbie question about spray concentrations
March 13, 2016 09:52PM

Registered: 11 years ago
Posts: 58

To add to the confusion---I have an air blast sprayer and was originally trained to to go slightly beyond the point of runoff with 200-400 gallons an acre! At 400 with full grown trees (14 + ft high) they were dripping...pretty scary cause back then I was using lotsa lime sulfur/micro sulfur (my warrior days). I had a 400 gallon tank. I settled on 200 gals for a couple of years and was convinced to go to 100 gals/acre and use finer nozzles to get an evener coating. All this so far at 100 PSI. As parts started wearing out I was in contact with the manufacturer (good old H Hauff Co in Yakima) and they convinced me to go to 80 psi and 8o gals/acre---no runoff and I get 5 acres covered with one tank! Great...less down time. Less wear on the pump at lower psi. And the results were as good...occasionally lost the scab wars, but I did also with 200 gallons.
As to how many pounds of this or that with what can be incredibly confusing instructions on bags of sulfur especially (6-30 lbs per 100 gals of water with no reference to gals/acre) well I go with how many lbs or ounces or gallons per acre using Michael's calcs above and you "sort of know". And be sure to use a real good sticker/spreader (Nu Film P...allowed for organic) so those finer nozzles don't clog up.
Now, I have one year old trees next to 80 year old trees next to 10 year olds. Those old guys don't die in blocks or rows. I have controls for right or left side so when I come to younger trees I either speed up or close off that side for a few seconds until I'm there and open it up for a second or two to hopefully get the right amount on the leaves.
So, now I'm on Michael's program (no more warrior stance and this year no sulfur---fingers crossed) for over 3 years and apply Neem, Fish, EM etc in amounts per acre and still use 80 gals per. And it works for me...so far. Now Nathaniel with very young trees I think you don't need 9.2 gals for the whole planting until many years from now, but I think more than 2 gals with incremental increases each year.
Also very curious how you came up with 18 X 24 ft spacings. And what rootstock the trees are on? And type of sprayer? Again, I'm for applying the amount per/acre once trees are established and amount of water is up to you.

The Apple Farm
Zone 8b in California
Reply Quote

Nathaniel Bouman
Re: Newbie question about spray concentrations
March 14, 2016 04:58AM

Registered: 9 years ago
Posts: 81

I planted on Bud. 118--which mostly explains the 18x24 spacing I think. I'm using a handgun sprayer. The tank size is 200 gallons (it's a Rears sprayer--can't remember the make of the nozzle). There is so much air between the trees still that an airblast sprayer would waste a lot of material.

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Ian Graham

Registered: 10 years ago
Posts: 59

Re: Newbie question about spray concentrations

April 09, 2016 11:15PM

Just posting to say the tree canopy volume metric was real helpful for small mixed orchard of 30 trees, not planted in straight rows, etc. I can go out and estimate tree volume, add it up and use that to calcul how much spray I'll need (still backpacking it). its planted permaculture style, intermingling varieties and non-fruit species (n2 fixers, nectaries) so a per tree spray rate is only way to go.

Old 99 Farm and permaculture site
Dundas ON 5b

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