FINGER LAKES

VINEYARD NOTES

NEWSLETTER NO. 5 **JUNE 10, 1999**

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SPRING DROUGHT – WHAT DOES IT MEAN FOR GRAPE GROWERS?

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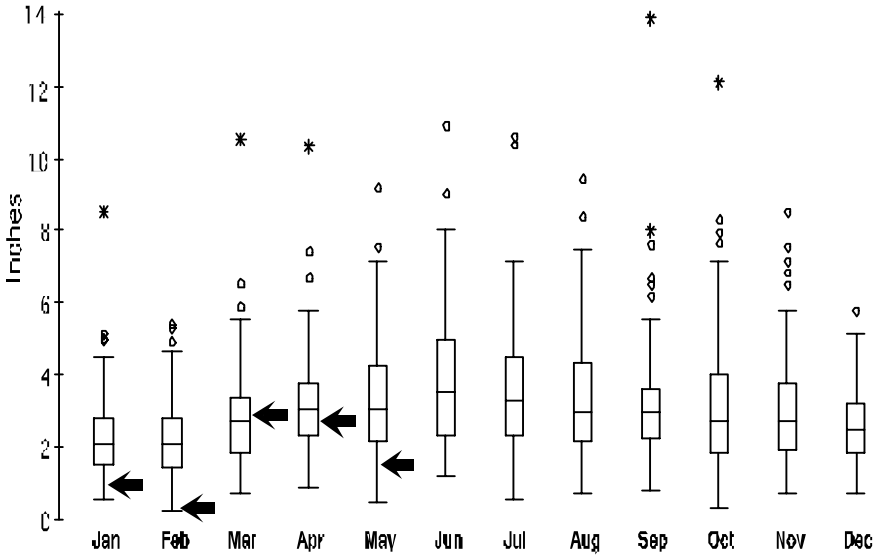

Figure 1. Monthly rainfall at Geneva for 100 years (January-May) or 99 years (June-December) presented as box plots. The horizontal bars divided the data into quarters.
* or ° represent unusual values (outliers). Arrows indicate rainfall in 1999. June is usually our wettest month; 75% of the years there has been more than 4 inches in June.

They say that everyone talks about the weather, but nobody does anything about it. This note is my attempt to end our current drought. I know by now that anyone so foolish as to write about something as changeable as the weather is asking for trouble, so I'm sure by the time you get this note, it will have been raining for at least a week, and your thoughts will have turned to the need for fungicides and concern about vineyard rutting rather than the need for moisture. Remember thank me for the rain.

How dry has it been? Pretty dry so far. Figure 1 shows monthly rainfall during this century at Geneva as a box plot. The horizontal bars divide the data into quarters. The middle bar represents the mid-point; half the years had more rain during that month and half had less. You can see that March and April were fairly normal, but January, February and May were well below normal.

So we had a dry spring; the good news is with no rain we haven't had much reason to spray for disease. The bad news is that we are going into mid-summer without much in the way of soil water reserves.

Does a dry spring mean a dry summer? Table 1 shows the growing season (January through October) and yearly (January through December) rainfall for the 10 wettest and 10 driest springs (January through May) of the century. Note that 1999 was the third driest spring. Also note that only three out of the 10 driest springs wound up with less than 80% of normal rainfall for the whole growing season. In three of those 10 years seasonal rainfall wound up above normal.

Year	Jan – May (inches)	Rank	% of Average for Period	Jan-Oct (inches)	Rank	% of Average for Period	Jan-Dec (inches)	Rank	% of Average for Period
1995	7.1	1	55.3	23.6	21	82	26.9	13	73
1988	7.2	2	56.2	19.8	3	69	23.1	2	63
1999	**7.3**	**3**	**57.0**	*****			*****		
1905	7.4	4	58.1	30.9	71	108	34.5	58	94
1982	7.5	5	58.8	19.6	2	68	25.3	5	69
1907	7.6	6	59.4	20.4	5	71	25.0	4	68
1981	7.7	7	59.9	24.1	25	84	27.9	18	76
1946	7.8	8	60.5	25.5	31	89	29.6	25	81
1934	8.1	9	63.6	18.4	1	64	23.4	3	64
1977	8.6	10	66.8	30.3	63	106	38.6	84	105
1956	16.6	91	129.6	30.0	61	104	34.2	56	93
1919	16.7	92	130.6	31.0	74	108	35.4	63	96
1940	16.8	93	130.9	32.2	84	112	36.9	76	100
1961	16.8	94	131.0	29.4	53	102	33.2	48	90
1990	17.2	95	134.4	36.2	93	126	42.6	95	116
1976	17.5	96	137.0	38.9	97	135	40.6	91	110
1929	18.2	97	142.0	30.5	66	106	35.5	66	97
1916	22.6	98	176.4	37.2	95	130	42.3	94	115
1924	27.1	99	211.4	60.3	98	210	65.8	98	179
1913	33.2	100	259.7	60.5	99	211	69.1	99	188
Avg.	12.8			28.7			33.8		

Table 1. One hundred years of spring precipitation and 99 years of yearly precipitation data from Geneva, New York. (Data is monthly rainfall in inches; Rank is from driest (1) to wettest (100) years.

One message I get out of these data is that you can't depend, nor can you predict the weather. Having a dry spring just doesn't tell us anything about how the rest of the year will go. For those of us that believe in weather cycles, the dry spring may even indicate above average rainfall sometime later in the summer or, worse yet, during harvest.

How will our dry spring affect the grapevines? If you've planted a new vineyard you've got plenty to worry about. New vines have no deep roots and require sufficient water in the top soil to sustain growth. The water can be from the rainfall or from irrigation. Because water use is related to leaf area, young vines don't need much water, but if you want to get your vineyard off to a good start, make sure that the vines don't get too dry. Other than controlling weeds and irrigating, there is not much you can do for newly planted vines. Mulch may help a little, but not very much, as the root system is so small that mulch just doesn't cover many roots.

Mature vineyards are not so vulnerable to early season drought. Deep roots can help carry vines through rainless periods, and because the leaf canopy has not yet fully formed, the spring water requirement is fairly small. Maximum water demand begins around bloom when there is a large leaf area and long days and higher temperatures result in more evaporation.

Vines tend to be less sensitive to drought stress before bloom, but the story is different for the rest of the summer. July is a period of rapid cell division in the berries, and any drought stress will reduce potential berry (and crop) size. Stress also tends to stop shoot elongation. Depending upon your vine's vigor status, that might be good or bad. As many have found out in recent years, perhaps the worst time for water stress is during fruit maturation. Inadequate soil water causes the

stomata (leaf pores which let water out and CO_2 needed for photosynthesis in, to close. This preserves water, but stops photosynthesis. As those who recently heard Dr. Stan Howell speak know, the vine seems to give ripening fruit first priority. The result is that, should photosynthesis cease during fruit ripening, carbohydrates usually available for root growth or for starch reserves needed to start vine growth next spring, are diverted to ripening fruit. The result is reduced root growth and poor cropping the next season.

What can you do about low soil water?

1. Irrigate – I know most of you don't think that is an economic answer. Jerry White has published data on the economics of irrigation to help you make that decision for yourself. I'd like to remind you of two facts. First, if you decide you have to use a system which reduces crop potential because you are afraid of the big crop/low water year, you are pay a yield price every year, a price you could avoid if irrigation was available. Secondly, higher value varieties will give a quicker pay back, and may provide improved fruit or wine quality to help justify cost of irrigation.

2. Weed control – Weeds and cover crops use water which otherwise would be available for the vines. A drought year is no time to let weeds develop in the row where they compete directly with the vine. Water consumption is reduced when cover crops are close mown, but cover crop regrowth soon restores full water use. Killing covers with a herbicide will stop water competition for about a month. Killed rye or ryegrass covers delay weed regrowth (6 – 8 weeks reduced weed competition), but a second herbicide application is just as good as a rye cover.

3. Mulch – a mulch cover ensures that no water is lost to the air through weed growth or by direct evaporation from the soil.

4. Nitrogen – adding or denying vines nitrogen will not change the vine's water status, but a dry spring often results in vines with a low

5. nitrogen status. The roots have not explored a large volume of soil and much of the fertilizer nitrogen may well have been lost to the atmosphere through volatilization. A split application of nitrogen after bloom will often benefit vines that have been through a very dry or a very wet spring.

6. Good wine – this won't help the vine, but it can help the grower endure drought stress in his/her vineyard. ♦

NITROGEN: WHERE IT COMES FROM, WHERE IT GOES, AND WHEN

Timothy E. Martinson

In previous issues of *Vineyard notes*, I wrote about *Why efficient Nitrogen Use is important* (*VN #2, February 1999)* and *Determining the nitrogen status of vineyards* (VN #3, April 6, 1999). The question that motivated this series of articles, was a simple one: We have tests to guide application rates of other fertilizers; why are recommendations for nitrogen fertilization so vague? Recall that the guidelines are to judge canopy fill, and vigor, and adjust N rates accordingly. While growers have adjusted *timing* of N fertilization for better uptake, there has been less consideration of appropriate *rates*, particularly for native and hybrid grapes.

In this article, I will address how much N is taken up and used by vines, where the N goes and when, and what this suggests for timing and amount of nitrogen fertilizer. Please note that most of the detailed work has been done on *vinifera* grapes.

Amount of N taken up by vines. Studies of 'thompson seedless' cropped at 14 T/acre in California showed N use to be about 100 lb/acre. For riesling from Germany (yielding 7 T/acre), nitrogen use by vines was 60 - 70 lb per acre. The amount removed at harvest amounted to about 30 lb/acre, roughly 3.6 lb. per ton of grapes. About 40% of the N went into vegetative growth (green shoots and leaves), 15% into permanent wood (trunks, roots), and 45% into the clusters (at harvest). Of the total N used for new growth, 30-36% came from vine reserves.

Seasonal Pattern of N uptake. Nitrogen demand, the source of nitrogen, and usage by different vine parts varies over the course of the growing season. It is useful to divide seasonal demands into 4 phases:

- Budbreak through bloom. Nitrogen is used by new shoot growth. Early growth depends on vine reserves. The N content of trunks, permanent shoots, and roots declines. Very little N is taken up from the soil until midway between budburst and bloom. (New root tips for absorbing nutrients do not form until after budbreak) Overall, 20-30% of the growth is supported by stored nitrogen during this phase.
- Bloom to veraíson. This is a period of active root uptake and high demand for N. Early during this phase, shoot growth dominates. As clusters develop, they consume progressively more of the N absorbed. The two weeks surrounding veraíson were identified as particularly important for maintaining cluster size a German fertilization study.
- Veraison to harvest. At this time, N uptake from the soil slows or stops. Most N goes to fruit clusters at this time. It moves from roots, shoots, and leaves to clusters. By harvest, clusters account for about 40% of total N present in green tissue.
- Harvest to leaf fall. After harvest, N uptake from the soil is active, and N from leaves and shoots is stored in roots, trunks, and shoots of the vines. In warm climates with extended post-harvest periods, most of the reserves used in the spring accumulate at this time. In cool climates such as ours, this period probably accounts for less of the vine reserves available in the following year.

The bottom line, here is that most nitrogen uptake and demand occurs between about 3 wk after budburst and veraíson. This is the reason that we have been recommending delaying the first N application until around bud break, and splitting applications between bud-break and post-bloom.

Sources of Soil Nitrogen. In California, following application of 30 lb/acre N, researchers estimated that at the end of the season, about 60 % of N came from the soil; 30 % came from vine reserves, and 10% of N in tissue came from fertilizers. The amount of fertilizer taken up by vines (applied with drip irrigation) was 30 - 35% of the amount applied, or about 10 lb/acre. The rest (60 lb/acre) was supplied by the soil. Vines were heavily cropped at 14 T/acre. In the Finger Lakes, estimates are that soils are capable of supplying 40 (sandy soils) to 75 lb/acre of nitrogen each year.

Nitrogen and Yield. Fertilization studies have found inconsistent relationships between nitrogen fertilization and yield. In a German study with riesling, fertilization increased yield only after 4 years. Vines with 27 - 150 lb/acre of N out-produced unfertilized vines, but *the amount didn't matter* in the range applied. 30 lb/acre produced as much as 150 lb/acre. A four year Concord study comparing N fertilization and irrigation in Arkansas showed no difference in vine size or yield for vines with 100-150 lb/acre vs. no nitrogen. Nitrogen did increase Brix levels in irrigated vines. Irrigation, however, increased yields and vine size by 30-50% compared to no irrigation.

What does this mean for NY growers? If vines use 70 (moderate yielding wine grapes) to 100 lb (14 T/acre Thompson seedless) of N per acre, how much nitrogen is it reasonable to apply? Based on the information above, here is a simple budget:

Total vine needs	100 lb/acre	70 lb/acre
Amount supplied from vine reserves (20% conservatively)	- 20 lb/acre	-14 lb/acre
Remaining amount	80 lb/acre	56 lb/acre
Amount supplied by soil (40-75 lb/acre)	-75 to -40 lb	-75 to -40 lb
Amount needed from fertilizers	5 lb to 40 lb	0 to 16 lb
Amount to apply (assume 30% efficiency)	15 to 130 lb	0 - 50 lb

Please don't take these figures as gospel. However, what they do suggest is that under the most extreme assumptions (vines yielding 14 T/acre, on coarse soils with low nitrogen-supplying ability) 130 lb/acre is the upper limit of what vines might need. More realistic assumptions might put many growers in the realm of 40 - 100 lb (heavily cropped juice grapes) or 0-50 lb/acre (moderately cropped wine grapes).

I found it striking that 30 lb/acre was a typical rate for heavily-cropped table/raisin grapes in California.

Summary. In this series, I have tried to provide some background based on recent research about N fertilization. The most common rate for nitrogen application that I hear from bulk wine and juice growers is 100 lb actual N per acre. Nitrogen is inexpensive, and applying that quantity is a 'safe' decision for maintaining yields and vine size. Evidence suggests that growers could maintain production and vine size with lower rates of N. While using lower rates might not save a lot in production costs, there are other reasons to experiment with lower rates. As mentioned in the first article, nitrogen application will come under increased scrutiny, because of water quality concerns related to nitrogen leaching. Finger Lakes growers have adjusted timing of N applications in response to recent research. I think that there is room to experiment with lower N rates. If you currently apply 100 lb/acre of nitrogen, you may want to consider your site characteristics and try cutting the rate by 20% on a test block. The research evidence suggests that yield and vine size won't suffer.

Sources:

O. Lohnertz, 1991. *Soil nitrogen and the uptake of nitrogen in grapevines.*
W. J. Conradie, 1991. *Translocation and storage by grapevines as affected by time of application.*
L. E. Williams, 1991. *Vine nitrogen requirements - utilization of N sources from soils, fertilizers, and reserves.*

All of the above are from: Proceedings of the international symposium on Nitrogen in Grapes and Wine, American Society for Enology and Viticulture, 1991.

J. R. Morris, S. E. Spayd, and D. L. Cawthon. 1983. *Effects of Irrigation, pruning severity, and nitrogen levels on yield and juice quality of Concord Grapes.* American Journal of Enology and Viticulture 34:229-233. ♦

VINEYARD FLOOR MANAGEMENT

Tim Weigle - Grape IPM

With the dry conditions we have seen so far this spring in the Finger Lakes Region, vineyard floor management – both between the rows and under the rows – needs to be a priority. A common method used to reduce competition is row center Roundup applications. With this type of row center management root systems are not disturbed. Weed roots are left in place allowing equipment quicker access to a vineyard after a heavy rain, increasing organic matter in the soil and reducing soil erosion and compaction. Row middle Roundup applications are generally timed to manage vegetative growth during the critical cell division period of berries that occurs from bloom to 30-days post-bloom.

Low volume applications of Roundup for row middle management have been shown to work in most every type of vineyard situation. Guidelines for low volume application of Roundup include:

1. Sprayer should have flat fan or low pressure flood jet nozzles. With the introduction of the air inclusion nozzles, you may want to try these out also.

2. Apply Roundup herbicide in 5 to 10 gallons of water carrier per sprayed acre.

3. Obtain 30%-50% spray overlap

4. Use 25-35 psi spray pump pressure.
5. Apply at less than 10 mph.

A potential problem which you might run into this year is increased resistance of weeds to herbicide applications due to drought stress. When stressed, the waxy leaf cuticle of weeds often becomes thicker as a method to control water loss. This added barrier can reduce the effectiveness of Roundup applications. The addition of ammonium sulfate at the rate of 17 lbs/100 gallons of water can help Roundup penetrate the cuticle and may improve the performance.

Low volume Roundup application is just one method of floor management. Mulching is

another option which has been used successfully in Finger Lakes vineyards. Cultivation is not encouraged due to damage to roots, increased soil erosion, and the poor economics.

The bottom line is, whatever floor management practice that you choose, it should be timed to decrease competition during the period from bloom to 30-days post bloom. ♦

NEWS FROM THE PROCESSORS

Timothy E. Martinson

Ed. Note: This new column will be a continuing feature of Vineyard Notes. The purpose is to provide a means for area wineries and processors buying Finger Lakes grapes to inform growers and industry personnel about significant business developments. If you have an item for this column, please write a brief paragraph and submit via e-mail to ***tem2@cornell.edu,*** *or send to our office in Penn Yan. There is no specific deadline; items will be printed in the following issue of Vineyard Notes.*

Heron Hill. This week the building project at Heron Hill has really begun to take shape as the arched roof trusses of the new tasting room were installed. The project, which began last September, incorporates a new tasting room, a fully renovated sales room, offices, conference room, a barrel storage cellar and parking for 80 cars. Encompassing approximately 5,000 sq ft of new production and visitor reception space, completion is expected July 1, 1999 with a Grand Opening slated for July 24th.

Earle Estates Meadery is constructing a new winery facility on Rte 14, 3 miles north of their present tasting room near Himrod. Construction is slated for completion on July 15. The building will house production facilities for the Meadery, as well as a new winery, **Torrey Ridge Winery**, featuring mainly grape wines. The current tasting facility for the meadery, featuring meads and fruit wines, will remain open at its current site near Himrod.

Sheldrake Point Vineyard and Cafe, located on Sheldrake Point, W. Cayuga Lake, Ovid, opened its cafe and winery last summer. After planting 16 acres of *vinifera* grapes last year, another 16 acres (cabernet franc & riesling) were planted this year. The goal is to have 75 acres planted over the next few years. The winery will be bottling 1,500 cases from the 1998 vintage, and will produce riesling, cabernet franc, gamay and pinot noir at their new winery facility in 1999. A wing is being added to the cafe (opened in 1998) to increase kitchen and service space. ♦

THANKS TO SPRAY MEETING SPONSORS

Timothy E. Martinson

The spring spray meeting, held May 19 at Lance Fullager's vineyard supplies, attracted about 130 participants, with 101 signing up for pesticide recertification credits. I would like to thank all who participated in this event. Special thanks to Dr. Andrew Landers, who organized the sprayer demonstration, and to Bob Morse, Neil Simmons, and Jim Bedient for cooking the burgers, and to Michele Campbell for ordering food and coordinating the barbecue and pesticide recertification. Thanks also to the wineries for that donated wine and juice .

The following companies sponsored the barbecue and meeting:

BASF
JMS Stylet Oil
Elf Atochem
Gowan
Bayer
Zeneca
Rohm & Haas
Dow AgroSciences
Novartis Crop Protection

The following wineries donated wines and juices:

Castel Grisch Winery
Hazlitt's 1852 Vineyards
Anthony Road Wine Co.
Seneca Springs
Heron Hill Vineyards
Lakeshore Winery
Chateau Lafayette Reneau
Fulkerson Winery & Juice
Dr. Frank's Vinifera Wine Cellars
McGregor Vineyard
Cayuga Ridge Estate Winery ♦

UPCOMING EVENTS

July 7. Prop-tec and Airblast sprayer twilight meeting. Canandaigua vineyards, Naples. Tenative plans are to demonstrate drift-reducing air-inclusion nozzles for airblast sprayers and find out about Canandaigua's early experience with their new Prop-Tec vineyard sprayer. Details to follow.

July 14-17. International Oak Symposium and 24th Annual Meeting of ASEV/ES St. Louis, Missouri. The Eastern Section of the American Society for Enology & Viticulture has organized an outstanding symposium on the use of oak in winemaking. This international symposium will be held in conjunction with the annual technical meeting and trade show. Oak Symposium: 14-16 July 99, Trade Show and Annual Meeting: 16-17 July 99. Call our office (315)536-5134 for registration forms and information.

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