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Wine Grape Recommendation

For the Okanagan Valley of British Columbia

Early canopy and reproductive growth applications

Post-dormancy break, from 2-inch to 6-inch shoots
TruPhos MeriStim @ 1 liter per acre

From first racime emergence to approx. 3-inch long racime
TruPhos MeriStim @ 1 liter per acre
ZincMax @ ½ liter per acre

From immediately pre-flowering to full flowering
ZincMax @ ½ liter per acre
CalciMax @ ½ liter per acre
BoronMax @ .4 per acre or SprayBor @ 2 pounds per acre

Fruit cell division and raceme elongation applications

After full fruit set
TruPhos MeriStim @ 2 liters per acre
ZincMax @ ½ liter per acre
CalciMax @ ½ liter per acre

BB-sized fruit
TruPhos MeriStim @ 2 liters per acre
CalciMax @ 1 liter per acre

At pea-sized fruit
TruPhos MeriStim @ 2 liters per acre
CalciMax @ 1 liter per acre

Fruit bulking and sugaring applications

Pre-veraison to early veraison
TruPhos Magnesium @ 2 liters per acre

Late veraison or immediately after veraison
TruPhos Magnesium @ 2 liters per acre
K-Max Extra @ 1 liter per acre

Beginning at 15-20^{o} brix, as needed every 7 to 10 days
K-Max Extra @ 2 liters per acre

Important qualifying notes:

These recommendations are based on typical nutrient requirements at key demand periods, and do not take into account specific soil nutrient shortages or other unique environmental factors.

The choices of essential elements at each peak demand period are based on most limiting factors for this crop; other elements that are not listed here may also be appropriate at each timing, but those listed are considered the most economically important or most limiting at that time period.

There is no perfect single seasonal nutritional program that fits all cases; for maximum effectiveness, any program must be modified to each specific situation based on soil and tissue analysis and on historical data and knowledge of the particular field.

The rates and total number of applications recommended here may require alteration for economic or other practical reasons. Contact your NutriAg representative for help in determining which applications are most important to your particular situation.

Maximizing yield and quality potential with foliar nutrient intervention

All soils impose inherent and varying limitations to plant nutrient uptake based on soil texture, soil type and organic composition. The sum of these factors is the soil's buffering capacity, which dictates efficiency of soil fertilizers.

The main advantage to foliar applied nutrients is that they are not subject to soil nutrient uptake limitations. Rather, practically the only restrictions to realizing substantial benefits from foliar feeding are improper application timing and use of poorly formulated products. Properly used high quality foliar nutrient products can and do have tremendous positive influence on yield and quality in practically all agricultural crops.

An important advantage to foliar nutrients is the immediate impact of application verses the slow response from soil application. Well formulated foliars provide rapid response to nutrient problems.

Basis to a thorough wine grape foliar program

Understanding annual development of both the fruit and vegetative portions of the vine is essential to developing a successful foliar nutrient program. Like soil applications, each foliar application affects the entire vine. It is however the crop itself, as well as the canopy, upon which we can more directly concentrate with foliar applications than with soil applications.

Therefore, as relating to how we can most influence the fruit, we should view fruit development in three distinct growth phases:
1) Stage 1 -- early growth from dormancy break through the end of fruit cell division
2) Stage 2 -- fruit sizing and bulking through cell enlargement and
3) Stage 3 -- fruit ripening and maturation.

The physiological processes are very different during each of these stages, and specific nutrients and concentrations of each are paramount to properly setting and finishing the crop.

The early growth period from dormancy break through the end of fruit cell division

Dormancy break is met with cold soil and cold to cool ambient temperatures, and often periods of high precipitation. Phosphorus and magnesium uptake and mobility in the vines are particularly affected by cold, wet conditions, making them generally limiting to growth. Even as ambient spring temperatures warm the above ground portions, P and Mg uptake remain limiting due to the temperature buffering capacity of the soil.

All growth at dormancy break, and most growth for weeks after, relies on cell division rather than cell expansion, both vegetative and reproductive. Certain nutrients are generally required in more abundance during this period than during the later stages. Those most limiting, and therefore most easily manipulated with foliar applications, are P, Mg and Ca, and the micronutrients, Zn, Mn, Cu, Fe and B. Some such as P, Ca and Zn should be applied in abundance, as they are incorporated into cells only or primarily at their inception during cell division. Abundant Zn during flower and raceme development will elongate the raceme to create better air flow in the bunches later on and less bunch disease.

Essential nutrients that occur in an anion form in the soil (N, S, B, Mo) are not usually limiting unless they are truly lacking in the soil. B is the exception, in that is has been widely demonstrated that foliar B before flowering or at early flowering can increase fruit set, even when B is adequate or abundant in the leaf/petiole. Using tissue analysis for judgment calls is ineffective at this time; only knowledge of physiological processes can lead to effective foliar applications.

Although the above nutrients will likely be limiting during this growth stage, even when soil concentrations are abundant, it is impossible to quantify how much they will limit growth without detailed soil analyses and, more important, historical data from the block in question. Early season application rate adjustments are best determined by prior knowledge of the block, but all blocks will benefit from judicial foliar applications of the right nutrients.

Fruit sizing and bulking

Providing good soil fertilization is practiced, particular soil nutrient limitations do not exist and required foliar nutrients were applied during the early growth stage, warm temperatures should enable sufficient uptake and distribution through the vine of P, Mg and most of the micronutrients. Tissue analysis now becomes a very effective tool to determine relative shortages of N, K, P, Mg and the micronutrients that would result from soil limitations. Foliar applications can be less important during this stage, as the vines are under less stress than at any other time during the growth cycle.

High demand for P, Mg, Ca and S can begin later in Stage 2 as the crop imposes a significant drain on photosynthate (sugars). This is especially true with heavier crop sets. As the fruit is now beyond the cell division phase while the canopy continues to grow by cell division, the two are in competition for certain nutrients such as Ca and P. Foliar applications of these nutrients should begin now in order to finish a heavy crop load.

Again, these generalizations do not compensate for actual soil limitations that result in foliar deficiencies. Tissue analysis and visual observation followed by tissue analysis should be heavily relied upon, as any element can be deficient at any time. Some nutrients such as P, Fe, Ca, Cu and Mo can cause deficiency symptoms and even production problems, even when soil/tissue analysis indicates they are sufficient or abundant.

Fruit ripening and maturation

More stress falls on the vine at this stage than at any other time. High temperatures and resulting water stress increase disease pressure and create high demands for certain elements. Those demands increase proportionately with crop load. Vines are concentrating all their soil nutrients and energy toward fruit ripening. Canopy growth by cell division has finally slowed down to a near stop so mature leaves can maximize photosynthesis. All energy is expended toward finishing the crop in relatively adverse conditions.

Some elements become limiting even when soil and tissue analysis indicate sufficient or better levels. P and Mg are nearly always limiting with a moderate to heavy crop load, as the root systems become inadequate to take up enough from soil to finish the crop…at least according to our expectations. Remember that the crop that is intended for proliferation of the species is not necessarily the one that makes the best wine.

Foliar P becomes critical to quality wine must from before veraison until harvest because of its role in photosynthesis and sugar synthesis in the canopy. Applications will therefore often accelerate ripening and maturity, allowing for an earlier harvest or longer hang time before harvest. P leaf deficiency symptoms are not easily identified until the deficiency is so sever that its ill effects are to late to correct.

As the central atom in chlorophyll, equivalent to Fe in human hemoglobin, Mg is critical to photosynthesis. A shortage of Mg equates to a shortage of photosynthesis, and in turn a lack of sugar production in the canopy. Again, foliar application puts Mg directly to leaves where it can be absorbed and incorporated into chlorophyll. It is in such high demand late in the season that it will mobilize from older less efficient leaves (Mg deficiency manifests on basal leaves later in the season) to shoot tips where it is integrated into newly forming, highly efficient leaves.

K is also often in short supply from the roots, and adequate K is essential for translocation of sugars from leaves to fruit. Foliar K is especially important from the vintner's vantage because overall sufficient foliar applied quantities can be far less than the amounts required for soil application to achieve the same effect. K from soil application can often accumulate at excessive levels in grape must.

Foliar Ca is also important to help maintain levels in the fruit. It is known in grapes to be extracted from fruit during heat periods to be translocated to leaves. Lack of Ca in ripening and maturing grapes results in higher incidence of Botrytis and other fungal infections. Ca is also extremely important toward overall vine health during this crop year as well as subsequent years.

Many deficiencies besides those mentioned here can become prevalent late in the season. Fe often manifests heavily toward autumn. Sulphur can become limiting later on, having a large effect on disease incidence. Cu and Mn are necessary for synthesis of proteins that are responsible for disease resistance, phytoalexins, and are often limiting late in the season. Additionally, foliar Cu and K have shown to deepen the color pigments in red and black grapes. Mo is important in some red varieties for disease resistance and alleviation of physiological maladies related to nitrate reduction and Mg deficiency.