PROHEXADIONE-CALCIUM IN WINE GRAPE PRODUCTION: YIELD RESTRICTION AND CONTROL OF BUNCH AND SOUR ROT

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ABSTRACT

Prohexadione-Ca (ProCa) is primarily an inhibitor of gibberellin (GA) biosynthesis, thereby reducing longitudinal shoot growth. Additionally, it inhibits ethylene formation and interferes with flavonoid metabolism. Attempts to reduce vegetative growth in grapevines failed, since extremely high dosages were required. However, it was noted in the course of these investigations that applications around flowering reduced berry set and/or led to small seedless berries. Pronounced effects on the incidence of bunch rot (caused by *Botrytis cinerea*) and sour rot (caused by different yeasts and bacteria) were observed towards the end of the season. This makes this new approach highly interesting, since these diseases occur often under German growing conditions and are difficult to control.

The commercial formulation Regalis® (10% ProCa) has been used in all experiments. Citric acid was admixed to the spray solution (pH adjusted to 5), in order to obtain rapid and complete uptake of the active ingredient. Dosages of 120 to 180 g/ha of ProCa applied at 50% capfall with 400 L/ha into the cluster zone gave the best results. Typically, berry yield was diminished by some 25%. The effect against bunch and sour rot was comparable to the one achieved with standard fungicides or even better. The best effects were obtained when an early ProCa treatment was combined with fungicide applications over the season. As a result of yield restriction and reduced pathogen incidence, must quality was clearly enhanced. Panel tasting of wines from ProCa-treated vineyards led to similar conclusions. Since 2008, Regalis® is allowed for this usage in Germany. A regular registration is expected for 2011. Applying GA₃ at mid-flowering is also giving reductions in bunch and sour rot, but may have negative effects on vegetative growth and fruit formation in the following year. Such effects have never been observed when using ProCa.

Appropriate levels of GAs are required for berry set in table and wine grapes. Both a lack and a surplus of biologically active GAs may lead to berry abortion. ProCa is an inhibitor of late stages of GA metabolism. Typically, it leads to reductions in GA levels by inhibiting 3ß-hydroxylation and preceding steps yielding GA₁ and other active GAs. However, it may also delay the metabolic inactivation of GAs by blocking their 2ß-hydroxylation. This would intensify the effect of active GAs present at the time of treatment. At this moment it is still unclear, which of these mechanisms is decisive for berry set and further grape development. Most likely, the effect of ProCa on bunch and sour rot is primarily due to the formation of less compact clusters, thereby reducing squeezing and wounding of ripening berries. However, it is also known from work with pome fruit trees that ProCa induces 3-deoxyflavonoids with phytoalexin-like features. Preliminary work indicates that this mechanism may also be present in wine grapes: The intensity of latent infestation with *Botrytis cinerea* at flowering appears to be reduced, which would lead to less inoculum in developing berries and, therefore, to a delay in bunch rot incidence at the end of the season.

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