



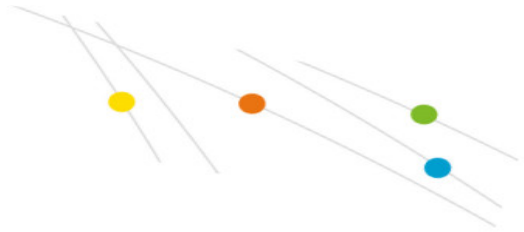
## Grapevine phenological phases and their nutrition requirements

The following plan is suggested for achieve the mentioned requirements, for table-grapes grapevines, e.g. 'Thompson Seedless', with an activity period of 240 days, and an expected yield of 25 MT/ha, by fertigation via drip irrigation.

Potassium nitrate (predominantly Ultrasol<sup>®</sup>) should be used as the primary source of potassium, and a partial source of nitrogen. The balance of nitrogen should be sourced from calcium nitrate, magnesium nitrate and ammonium sulphate, as per the following phase-specific rates.

This plan presents the mineral nutrition scheme, in terms of the mass proportions between the macro-, and secondary- nutrients.

Growth stage	Duration (days)	Physiological events	N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O:CaO:MgO			
I	40	Bud-break initiation - Flowering initiation	N K <sub>2</sub> O MgO	1 1.45 0.33	P <sub>2</sub> O <sub>5</sub> CaO	0.45 0.56
II	20	Full flowering	N K <sub>2</sub> O MgO	1 1.20 0.37	P <sub>2</sub> O <sub>5</sub> CaO	1.02 1.40
III	60	Fruit set - Veraison	N K <sub>2</sub> O MgO	1 1.51 0.28	P <sub>2</sub> O <sub>5</sub> CaO	0.57 0.93
IV	25	Veraison - Initial harvest	N K <sub>2</sub> O MgO	1 1.20 0.33	P <sub>2</sub> O <sub>5</sub> CaO	0.9 0.56
V	20	Harvest	N K <sub>2</sub> O MgO	1 1.81 0.83	P <sub>2</sub> O <sub>5</sub> CaO	0.23 0.56
VI	45	Early post-harvest	N K <sub>2</sub> O MgO	1 0.40 0.15	P <sub>2</sub> O <sub>5</sub> CaO	0.24 0.33
VII	30	Early senescence - leaf fall	N K <sub>2</sub> O MgO	1 0.12 0.17	P <sub>2</sub> O <sub>5</sub> CaO	0.23 0.14
Total	240	kg/ha	N K <sub>2</sub> O MgO	1 0.10 0.16	P <sub>2</sub> O <sub>5</sub> CaO	0.46 0.71
			N K <sub>2</sub> O MgO	95.0 86.5 15.4	P <sub>2</sub> O <sub>5</sub> CaO	19.0 48.5



Stage	Main nutrients to be applied and their functions during the said stages
I	Nearly 90% of the nutritional requirements are supplied from the reserves stored in the wooden organs of the plant, during the past growth season. However, it is necessary to augment this flow by a balanced nutrition solution. Nitrogen and potassium should start being taken up at a high rate.
II	N and K continue being taken up at high rate for new shoots. P and Ca are necessary at this stage mainly to support intensive development of the root system. Appropriate Ca uptake also ascertains that the quickly developing berries will not crack. Zn and B support large leaves and abundant photosynthesis.
III	P uptake is now markedly reduced, but still important for improving berries quality. In seedy cultivars it even increases for the seed development. K keeps growing, to pump sugars into the berries and increase their size. Almost 60% of the final berries size is accomplished at this stage. Ca uptake is still high to support berries firmness. Adequate supply of both latter nutrients will increase disease resistance of the leaves and berries.
IV	P demand is minimal at this stage. N, K and Ca are still required at high rates to support bulking up of the berries and provide their firmness and disease resistance.
V	N, K and Ca are still required at high rates to boost final size of the berries and provide their firmness and disease resistance. At stage V - VII, P requirement is relatively high, to support a second root growth wave.
VI	At the post-harvest period N, K and Ca are required at lower and diminishing rates. But applying these nutrients is important, to enhance their storage, along with carbohydrates, in the woody parts of the plant. They form the necessary reserve to feed the next year's early development. K is instrumental again in the translocation of the sugars, now to the other seasonal sink.
VII	In preparation to the dormant period, the plant now needs rather small supply of nutrients.

