# Photoreceptor and circadian-clock genes in *Vitis vinifera*: genome-wide identification, organization and expression profiling

**Quecini, V[1*]; Dal Bosco, D[1]; Sinski, I[1]; Girardi, CL[1]; Ritschel, PS[1]; Camargo, UA[1]**

[1]CNPUV, Embrapa, Av. Livramento, 515, 95700-000, Bento Gonçalves, RS. [*]Corresponding author: vera@cnpuv.embrapa.br

**Keywords:** development, functional genomics, genetic engineering, grapevine, light signal transduction

Plants growth and development are synchronized to the environment by the integration of endogenous processes and environmental cues, mainly light and temperature. Light perception, signaling and the endogenous time-keeping mechanism are involved in several integrative steps that allow plants to anticipate environmental changes, such as diurnal and seasonal oscillations. Environmental interpretation and anticipation maximize the plants adaptation to the surrounding conditions. These mechanisms are of critical importance for perennial species, since their growth and development consist of periods of active growth and dormancy coinciding with the alternation of the seasons. The cycling of meristematic activity is reflected in the morphology of the growing points on the plant; active meristems are present on shoot tips during the spring growth flush, and buds are initiated later in the season to protect the meristem from the extremes of winter, indicating a progression of developmental programs in perennial buds during their annual cycle. We are employing reverse genetic approaches to identify orthologs of functionally characterized genes involved in the endogenous time-keeping mechanism, light and temperature sensing in perennial *Vitis* species. The genetic framework underlying light and circadian developmental control in *Vitis vinifera* has been devised by *in silico* analyses of sequence and motif conservation, expression profiling and candidate gene mapping. We have identified extensive sequence conservation and syntenic regions between *Vitis* and *Arabidopsis thaliana* genomes. Events of differential expansion of gene families were detected, suggesting a prominent role of light perception and signaling in this climbing perennial in contrast to *Arabidopsis*. Our results demonstrate the power of comparative genomics to help elucidate aspects of plant physiology and development in economically important non-model species. The understanding of the molecular mechanisms underlying developmental processes will allow a more precise and environmentally safe management of fruit production, mainly under tropical and sub-tropical climate conditions.

Financial support: Embrapa MP2 02.05.02.09.00.05 to P.S.R.