



The role of cyanide in breaking sweet cherry flower bud dormancy



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Background

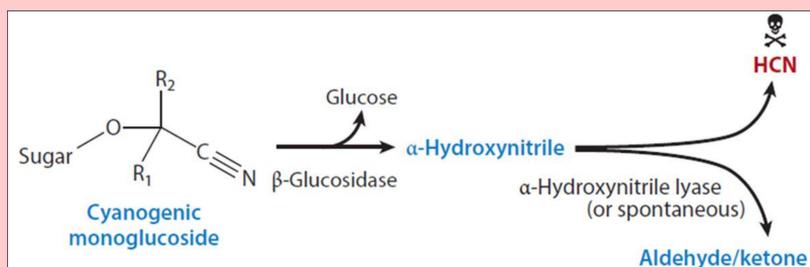
Perennial plants are characterized by the **ability to suspend and resume growth in response to environmental conditions**. This is crucial for their survival.

Bud dormancy is defined as the inability to initiate growth under favourable conditions. Three main factors are known in breaking bud dormancy in perennial plants:

1. Flowering requires a variety-dependent amount of **chill units (CU)** and heat hours, so-called **growing degree hours (GDH)**. Hence, climatic change becomes a more and more threatening factor.

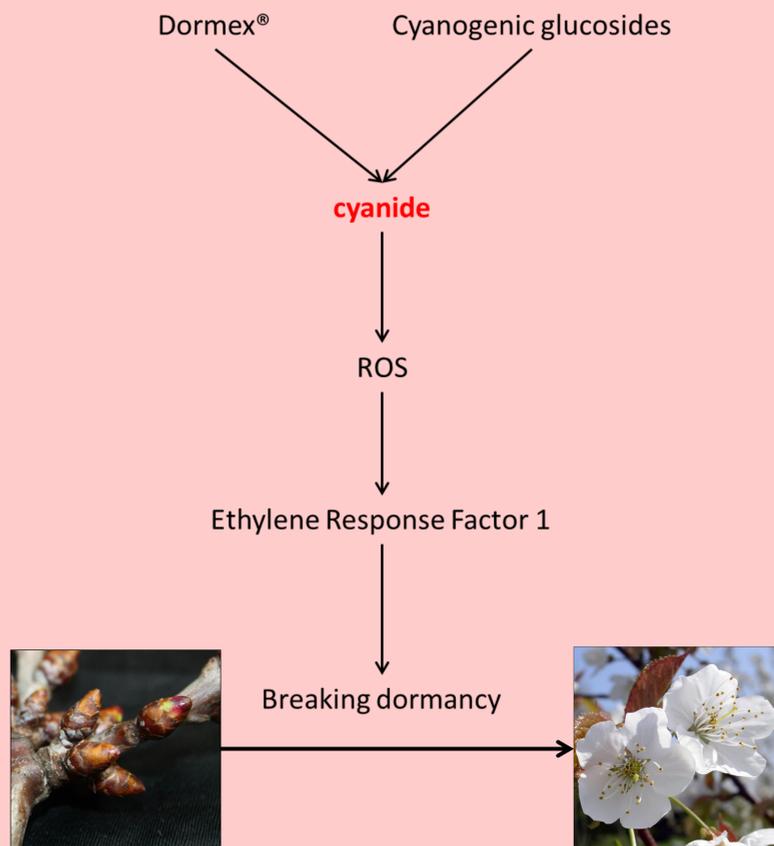
2. DORMANCY ASSOCIATED MADS-BOX genes (DAM genes) are highly expressed during dormancy and play an important role.

3. Cyanide-releasing compounds like hydrogen cyanamide (principal component of Dormex[®], prohibited in the EU from application in the field) **can induce flowering**. Cyanide (HCN) can also be released by ancient defense compounds called **cyanogenic glucosides**.



Turn-over of cyanogenic glucosides as a defense mechanism [1]

Hypothesis

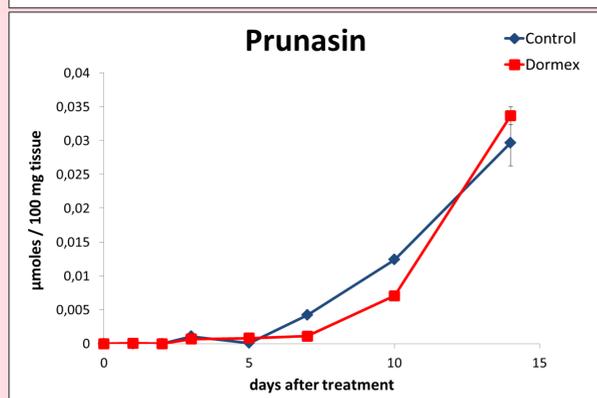
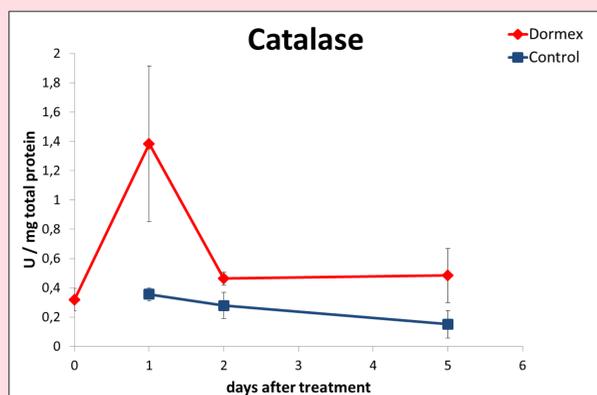


Cyanogenic glucoside and catalase levels in sweet cherry flower buds



Control

2% Dormex[®]



Conclusions

- **Catalase** levels increase distinctly in sweet cherry flower buds following Dormex[®] treatment: up to 1,4 U/mg total protein compared to an untreated control (preliminary results).
- The prompt up-regulation of catalase could suggest a direct effect of Dormex[®] on the activity of the enzyme.
- The levels of cyanogenic glucoside **prunasin** increase up to 100 ng/mg flower bud tissue during breaking dormancy.
- Cyanogenic glucosides are likely to have a controlling role in breaking dormancy based on their ability to release HCN.
- Cyanogenic glucosides turn out to have many more functions than just being defense compounds.



Acknowledgements



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Reference:
[1] GLEADOW, R. M. & MØLLER, B. L. 2014. Cyanogenic glucosides: synthesis, physiology, and phenotypic plasticity. *Annu Rev Plant Biol*, 65, 155-85.