

Ochratoxin A: from grapes to wine

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Ochratoxin A (OA) is a kidney toxin and potential carcinogen which has been detected in a variety of foods, including grapes and grape products. Cereals and the meat of animals fed on cereals are the most important dietary sources. OA is primarily produced by *Penicillium verrucosum*, *Aspergillus ochraceus* and black *Aspergillus* species such as *A. niger* and *A. carbonarius*.

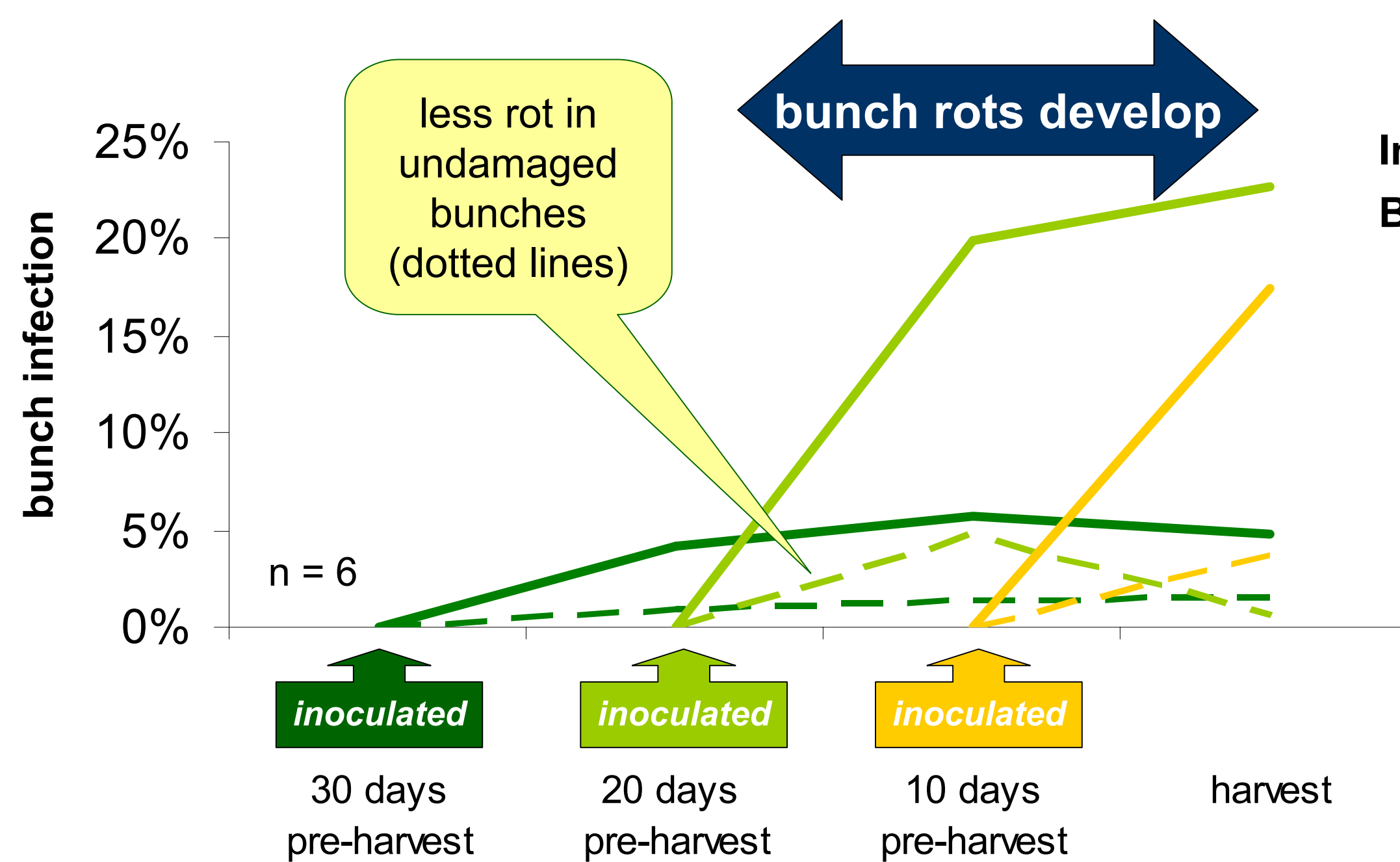
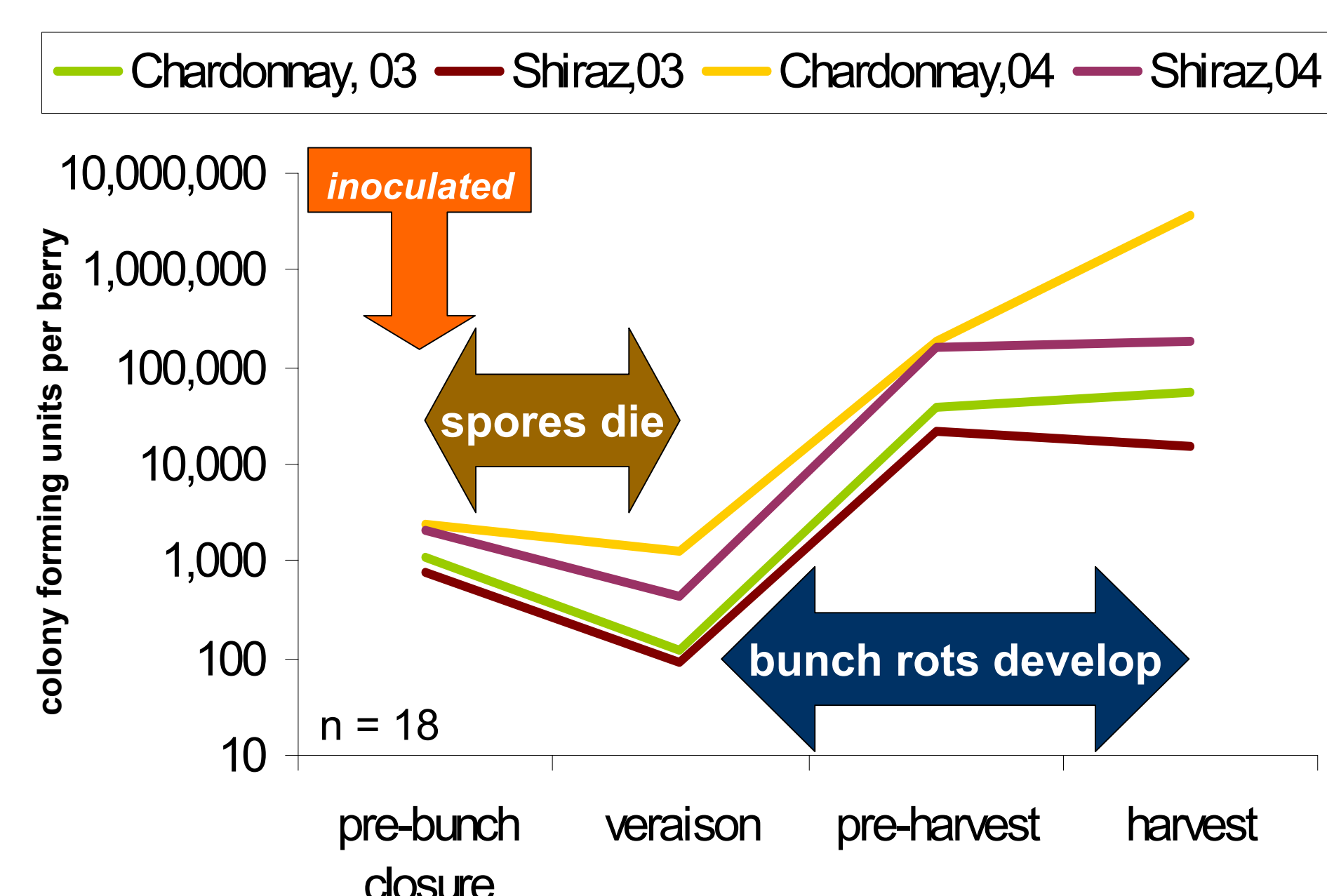
The European Union is discussing a limit of 2 ppb OA in table wines.

Over 600 Australian wines tested to date have been well below this limit.



A. carbonarius is the main species thought to be responsible for OA in grapes. It has been isolated from grapes in France, Spain, Italy, South America, Greece, Israel, Portugal and Australia.

A. carbonarius is an opportunistic pathogen of grapes. Berries damaged by rain, insects, mildew or *Botrytis* can be susceptible to *Aspergillus* bunch rots.



Inoculated: 20 days pre-harvest
Berries pricked with pin

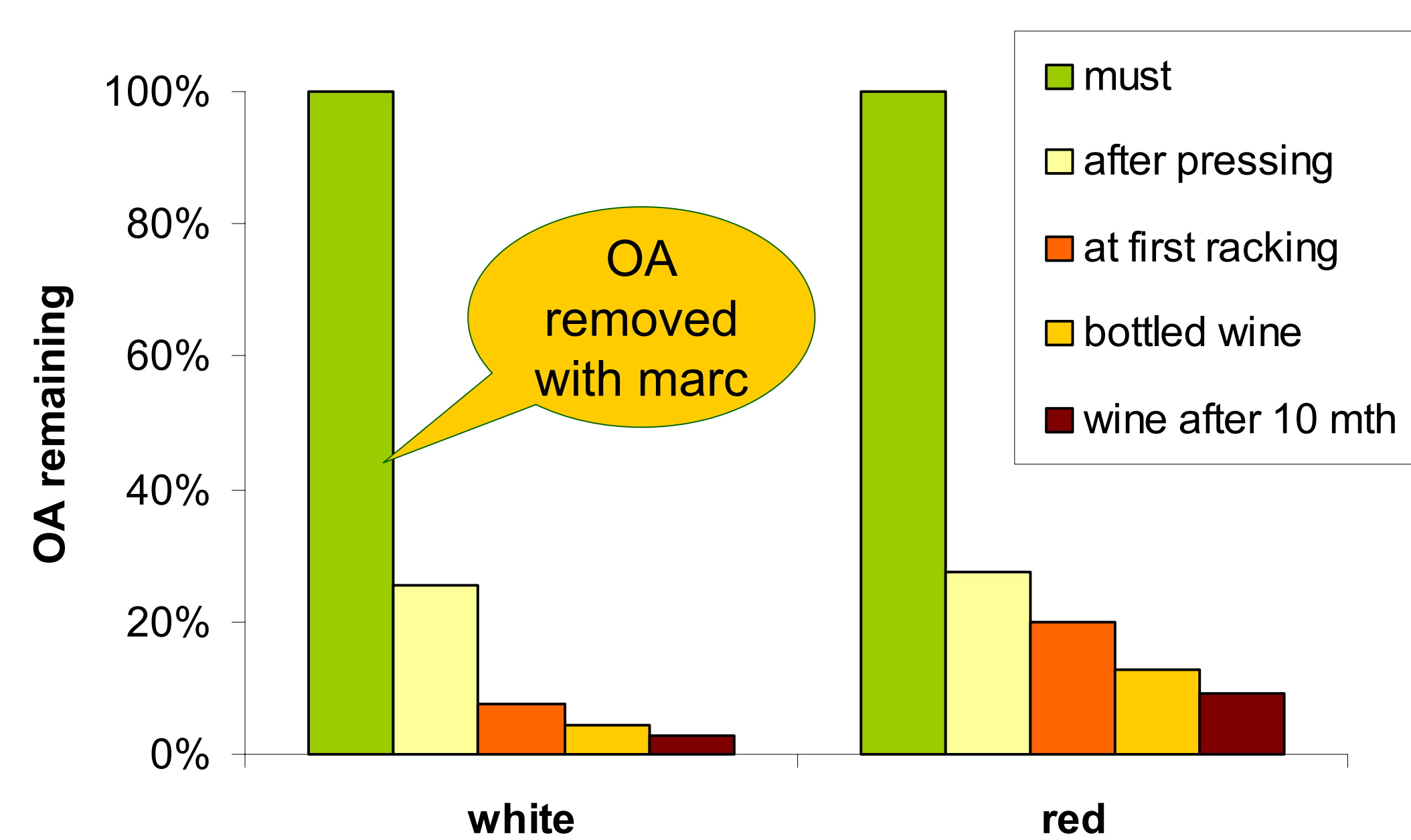


Inoculated 20 days pre-harvest
Berries undamaged



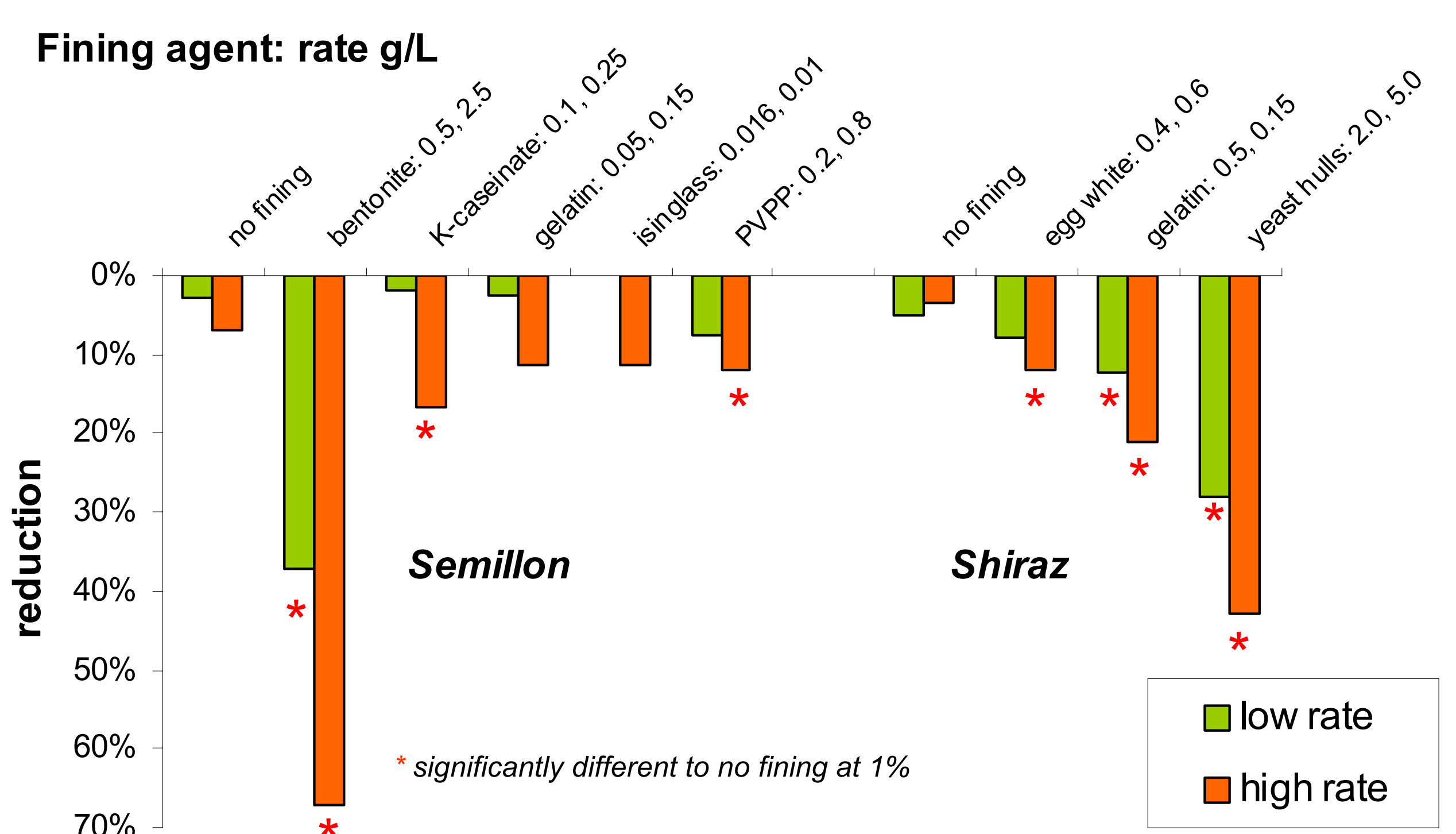
Aspergillus bunch rots do not develop early in the season. *A. carbonarius* spores inoculated onto bunches die between pre-bunch closure and veraison. After veraison, bunch rots may develop.

The period from 20 days pre-harvest (12.3 °brix) until harvest was the critical time for the rapid development of *Aspergillus* rots. Semillon bunches were inoculated with *A. carbonarius* spores and damaged by pricking with a pin. Undamaged bunches (dotted lines) showed less infection despite receiving identical inoculum.



Wine made from inoculated grapes, 2002 and 2003. n = 16

Fining to remove proteins simultaneously removes OA.
Proteinaceous fining agents also remove OA.



A proportion of OA from grapes is carried through into wine. Most of the OA is removed with the marc during pressing. OA loosely binds to grape solids and also to yeast during fermentation. Further reductions occur during racking. More OA is removed during white than red vinification due to the removal of white grape solids before fermentation.

OA appears to be associated with proteins in wine.

Addition of bentonite to Semillon wine containing 56 mg/L grape protein removed these proteins, and concomitantly, removed up to 67% of OA. The Shiraz wine did not contain detectable grape proteins, hence the addition of proteinaceous agents was effective in binding and precipitating OA.

The CRC for Viticulture is a joint venture between the following core participants, working with a wide range of supporting participants.

