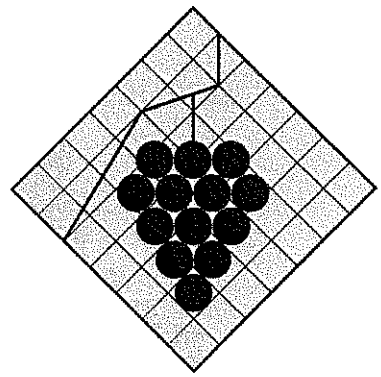


Grape berry development and composition

FINAL REPORT to
GRAPE AND WINE RESEARCH & DEVELOPMENT COUNCIL

Project Number: **UA 3GW**

Principal Investigator: **Dr B G Coombe**

Research Organisation: **The University of Adelaide**

Date: **1990**

FINAL REPORT FOR GRAPE AND WINE RESEARCH COUNCIL

Project title:	Grape berry development and composition
Project number:	UA3V
Organisation:	The University of Adelaide
Location:	Glen Osmond, South Australia
Supervisor:	Dr B.G. Coombe
Time span:	1987-1990
Objective:	**To find reasons for variation in grape composition**

Winegrape quality is determined by berry composition. Grapegrowers can do little to influence the course of ripening of grape berries or alter the concentration of individual components. It is contended that better control is unlikely until the nature of the ripening process is clarified The small grants provided during the three years of this research (1987-90) were used to assist a general research program which aims to help provide basic information on the mechanisms controlling ripening and the accumulation of organic compounds by grape berries. Three aspects were emphasised: the triggering of ripening in individual berries, the role of berry vascular bundles in the accumulatory processes, and the cause and control of the disorder, bunchstem necrosis.

Triggering of ripening. Triggering occurs independently in each berry and asynchrony between berries may lead to compositional defects in juice. The possibility that triggering depends on the hormone abscisic acid (ABA) was reinvestigated by dissection of berries before and after veraison and measurement of hormone levels by radioimmuno-assays. ABA levels in the flesh increased as ripening began and rose to a peak a few weeks later, then declined. There are indications that the timing of the increase in ABA differs in flesh pieces that contain vascular bundles. Since bundles form the link between berries and the rest of the grapevine, and might control the progress of berry ripening, this difference could prove to be an important lead.

Vascular bundles and accumulation. Individual berries have up to one metre length of vascular bundle most of which is established during the first six weeks of berry development after flowering. The idea that the rate of dry matter accumulation in ripening berries is limited by the density of vascular bundles is being tested by a comparison of berries varying in size on leafed and defoliated vines. Another finding of importance is that the decline in acidity associated with grape berry ripening seems mainly to be due to respiration of malate in the bundles. Methods for studying this idea are being sought.

Bunchstem necrosis (BSN). Necrosis of the bunchstem is a physiological disorder, regarded in Europe as a localised magnesium/calcium deficiency. It has serious consequences on yield and quality of some winegrapes in Australia, especially in Cabernet Sauvignon. We have shown that Mg alone is unlikely to be the main cause of the disorder, that its incidence correlates with shoot vigour, and that the symptoms can be induced by injection of bunches, before veraison, with ammonium salts or the phytohormone abscisic acid or a synthetic auxin, BTO. It is hoped that analyses of peduncles from these experiments will show whether there is a single component that correlates with its incidence.

A related disorder called early BSN has been described which occurs before and at flowering, leading to poor fruitset. It is most severe in vigorous and shady canopies

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and, like BSN, appears to have a nutritional cause. Possible links with ammonium and hormones will be explored later.

Conclusion. New understanding of the nature of grape berry ripening has been gained. However, furthur research methods must be developed and brought to bear to help unravel the causes of variation in grape composition which are, in turn, the ultimate cause of variation in winegrape quality.

References.

Jackson, D.I. and Coombe, B.G. (1988). Early bunchstem necrosis. A cause of poor fruit set. Proc. 2nd Int. Symp. for Cool Climate Vitic. and Oenol., Auckland. New Zealand Soc. for Vitic. and Oenol., Auckland, New Zealand. pp 72-75.

Jackson, D.I. and Coombe, B.G. (1980). Early bunchstem necrosis in grapes - a cause of poor fruit set. Vitis 27, 57-61.

Coombe, B.G. (1989). The grape berry as a sink. Acta Hortic. 239, 149-158

Coombe, B.G. (1990). Research on berry composition and ripenigng. Proc. 7th Aust. Wine Ind. Tech. Conf., Adelaide, SA, 1989. Aust. Wine Research Inst., Glen Osmond, SA 5064. pp 150-152.