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Identification of Grape Rootstocks and Varietal Clones by DNA Fingerprinting

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INTRODUCTION AND OBJECTIVES

Correct identification of grapevines is of extreme importance to the expanding U.S. viticulture and wine industries. Several recent cases of misidentifications have occurred because the tools for accurate typing of plants are either inadequate or lacking. We have been applying one type of DNA-based procedure that has shown great promise in distinguishing a variety of closely-related plants and other organisms. We summarize here our preliminary results based on its application to rootstock identification.

The objectives of this research are to isolate DNA from leaf tissue derived from rootstocks in the collection of the OSU Department of Horticulture and selected commercial sources and to screen 'RAPD" primers in DNA amplification reactions to generate genetic markers able to fingerprint each rootstock.

RESULTS AND DISCUSSION

DNA was isolated from 15 samples of nine different rootstocks including samples of uncertain origin. A relatively crude and convenient DNA isolation procedure based on use of the detergent hexadecyltriniethylammonium bromide (CTAB) was found to be inadequate. However, the CTAB-purified DNA was found amenable to analysis after further purification.

Using our fingerprinting method, we found that we could distinguish all 9 different rootstocks examined. (Table 1). The DNA markers are indicated in the table as numbers and their presence in a given rootstock is shown with a '+". Examination of the table shows that each rootstock has a unique pattern of markers except for Couderc 3309 and 1616. (We have recently identified a new marker, not included in the table, that now also distinguishes these two.) The pattern of markers obtained for 5C was identical to that obtained for two different samples of S04. Based on the recent history of mistaken identities involving these two rootstocks, it is possible that the latter samples were only mistakenly believed to be S04. Another sample of S04, (SO4 #12), displayed a pattern that neither matched that of 5C nor that of the other S04s.

We have made initial efforts to improve the procedure by converting the genetic markers into a form that will make them more reliable and accessible to interested parties. We are also beginning to screen our collection of varietal clones which we anticipate will prove more challenging than the rootstocks.

	DNA MARKERS							
ROOTSTOCK	1	2	3A	4A	6	7	8	9
MG 420A	+			+	+			
Richter 99	+	+			+	+	+	+
5C*	+						+	
SO4 #4	+				+		+	
SO4 #12	+				+		+	+
Riparia Gloire	?							
Couderc 3309				?	+			?
MG 101-14				+			+	+
Kober 5BB	?		+					+
1616					+			

Table 1. DNA fingerprints of rootstocks. A "+" indicates the presence of the indicated marker (#1-#9) when rootstock DNA was used in an appropriate DNA amplification reaction. A "?" indicates an ambiguous result. *The pattern presented for 5C was the same obtained for two other SO4 isolates (SO4 #3 and SO4 #14).