

FIELD INDEXING FOR AVOCADO SUNBLOTCH DISEASE

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OPSOMMING

'n Vinnige PAGE indeksering metode vir sonvlek besmetting op gevestigde avokado bome is suksesvol getoets. Al die 52 blomknop monsters van bome wat met sonvlek besmet was, was positief, terwyl slegs 37 uit 72 blaarmonsters van besmette bome positief getoets is. Die toets het slegs 6 uur geduur teenoor 'n toetstyd van 2-5 dae volgens ander metodes

SUMMARY

A rapid PAGE index method for avocado sunblotch has been successfully tested on field trees. All 52 flower bud samples from known sunblotch-infected trees tested positive, whilst only 37 out of 72 infected leaf samples gave positive results. The test takes only 6 h compared with 2-5 days for other methods.

INTRODUCTION

In a preliminary study da Graca and Goodman (1982) found that while levels of avocado sunblotch viroid (ASV) RNA in mature leaves were frequently too low for detection by polyacrylamide gel electrophoresis (PAGE), the RNA levels in flower buds appeared to be considerably higher.

The use of flower buds as test material was therefore investigated on an extensive scale to determine its reliability for sunblotch indexing.

MATERIALS AND METHODS

Leaf and flower bud (Fig. 1) samples were collected from known sunblotch-infected trees of various cultivars in the Levubu, Tzaneen, Nelspruit and Schagen areas of the Transvaal, and Baynesfield and Richmond in Natal. Where trees displayed symptomless "recovery growth", separate samples were taken.

Five-gramme samples were extracted and analyzed for ASV-RNA as described previously (da Graca, 1981; da Graca and Goodman, 1982).

RESULTS

A total of 52 flower bud samples were tested and the ASV band was detected in all of them, whilst of the 72 leaf samples only 37 (i.e. 51,4%) were positive. Detailed results are presented in Table 1.

Not only was the sunblotch viroid detected less frequently in leaves it was usually less concentrated and there was often background staining probably due to polysaccharides (Fig. 2). In 11 cases the leaves and flower buds from the same tree gave equal results, but in only two were the leaf sample results better than the flower buds.

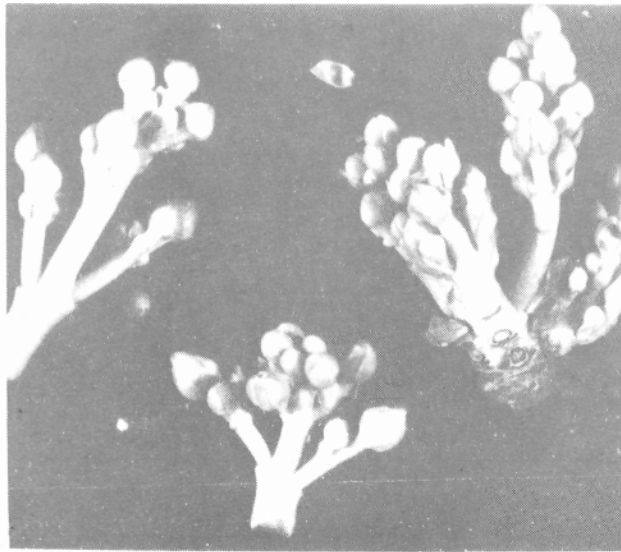


FIG. 1 Avocado flower buds at the stage used for sunblotch indexing.

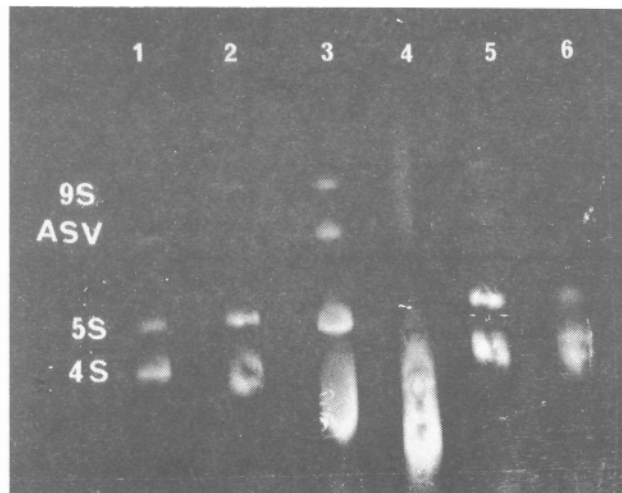


FIG. 2 Comparison of flower buds and leaf extracts for sunblotch indexing by PAGE. Nos. 1,3 and 5 — flower buds; Nos. 2,4 and 6 — leaves. Note the background staining in No. 4.

TABLE 1: Comparison of leaf and flower bud extracts for sunblotch detection by PAGE

Area (Grower)	Cultivar	Sunblotch status ^a	Index results positive/no. tested	
			(No. Leaves	Flower buds ^b
Levubu (F. Kuhn)	Fuerte	+ S	1/1	1/1
	Fuerte	SC	1/1	1/1
	Ryan	+ S	1/2	2/2
	Mexican rootstock	SC	2/2	—
	Collinson	+ S	1/1	—
Tzaneen (Westfalia Estates)	Hass	+ S	0/1	1/1
	Edranol	+ S	1/2	2/2
	Edranol	SC	3/3	3/3
	Fuerte	+ S	0/2	2/2
	Fuerte	SC	1/2	2/2
	Ryan	+ S	0/1	—
	Ryan	SC	1/2	1/1
	Dilly	+ S	0/1	—
Tzaneen (H. Blight)	Fuerte	+ S	1/3	3/3
	Fuerte	SC	2/2	2/2
	Edranol	+ S	1/1	1/1
	Edranol	SC	2/2	2/2
	Ryan	+ S	0/1	1/1
	Hessie	+ S	0/3	2/2
	Hessie	SC	0/1	1/1
	Athiska	+ S	1/1	—
	Mexican seedling	+ S	0/1	—
	Paragon	+ S	1/2	—
	Paragon	SC	1/2	1/1
	Ward	+ S	1/1	1/1
	Nabal	+ S	0/1	—
	Dickey A	+ S	0/1	—
	Linda	+ S	1/1	—
Collinson	+ S	1/1	—	
Collinson	SC	0/1	—	
Nelspruit (Hall & Sons)	Edranol	+ S	1/2	2/2
	Edranol	SC	3/4	4/4
	Mexican rootstock	SC	2/2	2/2
	Fuerte	+ S	1/1	1/1
	Fuerte	SC	1/1	1/1
Schagen (A. Hough)	Edranol	+ S	1/1	1/1
	Edranol	SC	1/1	1/1
	Nabal	+ S	0/1	—
	Nabal	SC	1/1	—
Baynesfield (T. Antal)	Edranol	+ S	0/1	1/1
	Edranol	+ S	0/1	1/1
	Mexican rootstock	SC	0/1	—
	Fuerte	+ S	0/4	4/4
	Fuerte	SC	1/2	2/2
Richmond (E Howes)	Edranol	+ S	1/3	3/3
Overall result			37/72	52/52

^a + S = With symptoms; SC = Symptomless carrier

^b — = No flower buds available

DISCUSSION

The complementary DMA probe technique for sunblotch indexing developed in Australia takes 5 days to complete, excluding the preparation of the DNA (Palukaitis et al., 1981). Its reported greater sensitivity than PAGE cannot be judged since it has not been compared to ethidium bromide stained gels. In addition it was tested on only four field sources.

The PAGE method developed in California using young leaves takes 2 days to complete and was reported to be 96% effective (Utermohlen and Ohr, 1981). However only 11 field trees were tested.

The method that we have developed in South Africa takes only 6 h to complete. It was found to be 100% effective using 52 samples of 8 cultivars from various parts of the country. An added advantage to using flower buds is that interference in the separation of bands from polysaccharides is not a problem.

We conclude that our method is the quickest, simplest and most reliable index method developed so far.

ACKNOWLEDGEMENTS

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