fortnightly fungicidal application is undesirable, 'Verdasan' affords the best possibility of control as yet. In view of the earlier failure to obtain direct control of the disease with fungicides, the importance of these results is considerable.

Repeated calcium sulphamate treatments at 1, 3 and 6 per cent were all found to be highly phytotoxic although previously a single application at 1 per cent had not produced any adverse effects.

A laboratory technique for testing fungicides on detached berries has given results comparable with those of the field trials. Preliminary tests using 'Griseofulvin' at a concentration of 880 p.p.m. have given results similar to 'Verdasan'.

Further field trials are in progress.

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[1] McDonald, J., *Trans. Brit. Mycol. Soc.*, **2**, 145 (1926).
[2] Rayner, R. W., *East African Agric. J.*, **17**, 130 (1952).
[3] Rayner, R. W., Ann. Rep. Dept. Agric. Kenya, Pt. 2 (Invest.) (1952).

Suppression of the Sprouting of Potatoes by the Vapour of Alcohols

The use of a growth-inhibiting vapour for the commercial suppression of the sprouting of potatoes offers certain advantages over the employment of suppressant dusts, though these have been used with success. In particular, application of the treatment can be delayed until signs of sprouting are observed —which in some years, when the onset of sprouting is late, can lead to an appreciable saving in cost— and the farmer need not decide whether or not to employ a sprout suppressant until some time after harvest, when he may be in a better position to know whether it is likely to be advantageous to store his potatoes late. Attempts have therefore been made to use a number of gases and vapours, as, for example, ethylene[1].

The fact that the volatile metabolic products of potato tubers will completely inhibit their sprouting, if allowed to accumulate in the absence of carbon dioxide, led to the discovery that the vapour of *n*-amyl alcohol was a very effective sprout inhibitor[2]. Ethyl alcohol vapour had previously been described as retarding sprout growth[3]. Later, the vapours of both *iso*-amyl and active amyl alcohol were found to be effective at concentrations of about 1 mgm./l., and commercial amyl alcohol (a variable mixture of the *iso* and active alcohols) was used successfully on the sixteen-ton scale[4]. It seemed possible that alcohol vapours in general might retard sprout growth, and the results of a number of tests, given in the accompanying table, seem to confirm this. In most cases no attempt has been made to extend the tests to cover a number of concentrations, although this has been done to a limited extent with nonyl alcohol, which has shown promise of being applicable on a commercial scale[5].

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[1] Barker, J., Rep. Food Invest. Board, Lond., for 1933, 80 (1934). Furlong, C. R., *Agric. J. Min. Agric.*, **55**, 81 (1948).
[2] Burton, W. G., *New Phytol.*, **51**, 154 (1952).
[3] Huelin, F. E., Rep. Food Invest. Board, Lond., for 1932, 51 (1933).
[4] Burton, W. G., *Annexe* 1954–1 *au Bull. de l'Inst. Intern. du Froid*, 81 (1954).
[5] Burton, W. G., *The Grower*, **45**, 1368 (1956).

Carbon Dioxide Injury and the Presence of Succinic Acid in Apples

Recent work in this Laboratory[1] has shown that succinic acid may not only inhibit oxidative processes, as shown by earlier workers[2], but also it may be actually toxic to plant material. Succinate supplied to respiring disks of apple peel (in a suitable buffer system at *p*H 4·1) at concentrations greater than about 0·025 *M* reduces oxygen uptake and carbon dioxide output, and in a comparatively short time the respiration falls practically to zero and the tissue becomes brown and 'dead'. At this external concentration of succinate the internal concentration is less than 0·001 *M*.

In normal healthy apples we have found succinic acid only occasionally and in trace amounts in either the peel or the pulp. This does not necessarily mean

Table 1. Suppression of the Sprouting of Potatoes by Alcohol Vapours

Variety of potato	Alcohol	Conc. (mgm./l.)	Temp. ° C.	Duration of expt. (days)	Wt. of sprouts as per cent total wt.	Wt. of sprouts on control as per cent total wt.	Sprouting on treated tubers as per cent that on control (approx.)
Dr. McIntosh	Methyl	18·3	10	68	0·19	0·36	53
Dr. McIntosh	Ethyl	15·1	10	84	0·0	0·76	0
Dr. McIntosh	*iso*-Propyl	8·9	10	84	0·0	0·76	0
Majestic	*n*-Butyl	5·4	10	55	0·02	1·64	1
Majestic	*n*-Amyl	1·5	10	34	0·0	1·05	0
Dr. McIntosh	*n*-Amyl	1·9	10	84	0·0	0·76	0
Dr. McIntosh	*tert*.-Amyl	9·0	10	84	0·0	0·76	0
Majestic	*tert*.-Amyl	0·6	10	51	0·0	1·07	0
Majestic	*n*-Hexyl	2·3	10	55	0·67	1·64	41
Majestic	*sec*.-Heptyl	2·6	10	55	0·0	1·64	0
Majestic	Octyl*	1·3	10	55	0·47	1·64	29
Majestic	Nonyl†	4·8	10	63	0·0	6·81	0
Stormont Dawn	Nonyl	3·7	10	91	0·0	3·85	0
Dr. McIntosh	Nonyl	0·2	10	172	0·0	5·02	0
Dr. McIntosh	Nonyl	0·02	10	109	0·07	2·02	4
Dr. McIntosh	Nonyl	0·06	20	54	4·35	6·74	65
Dr. McIntosh	Nonyl	0·07	20	17	2·74	2·73	100
Dr. McIntosh	Nonyl	0·31	20	21	0·0	2·88	0
Dr. McIntosh	Nonyl	0·87	20	22	0·0	3·50	0
Majestic	*n*-Decyl	1·6	10	55	0·14	1·64	9

* 2-ethyl-hexan-1-ol † 3-5-5-trimethyl-hexan-1-ol