

because, besides being of no value in the dehydration of alcohol, they occupy unnecessary space in the still and they consume steam which is not profitably spent.

The lower layer of the ternary azeotropic distillate, which contains most of the entrained water, is treated in a separate still for the elimination of water and for the recovery of alcohol and benzene. With the petrol fractions, the lower layer forms about 43 to 44 per cent. while with benzene it is about 13 to 15 per cent. It must be mentioned that the smaller the volume of the lower layer, the greater the efficiency of the process.

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¹ *Chimie and Industrie*, 1930; *I.S.J.*, 1930, p. 77.

² Sydney Young, *Distillation Principles and Processes*, pp. 177-180.

³ *Ibid.*, p. 179.

AN IDEAL PRESERVATIVE FOR SUSPECTED WASHES

IN cases of seizure of suspected washes, the plea often put up by the accused is that the wash seized is not really a fermented wash and that the alcohol detected has been formed after seizure due to use of an ineffective anti-fermenting agent. It was therefore thought desirable to study carefully the antifermenting properties of various preservatives commonly used for this purpose. In the United Provinces, Bengal and Bihar, 25 grains of salicylic acid are generally added to every quart bottle of suspected wash to arrest further fermentation.

Experiments were first carried out (under conditions similar to those used in actual practice in Excise cases) to test the power of arresting further fermentation of partially fermented washes of the following preservatives:

(1) Salicylic acid. (2) Benzoic acid. (3) Formic acid. (4) Mercuric iodide in potassium iodide solution. (5) Ammonium fluoride.

The results of some of these experiments are given in Table A. The table shows that formic

acid and ammonium fluoride are not suitable preservatives for checking further fermentation while salicylic acid, benzoic acid and mercuric iodide in potassium iodide are quite suitable for the purpose. Experiments were also done under varying conditions, *e.g.*, (i) in different seasons of the year, (ii) with mahua flowers as base, (iii) with addition of yeast food, but results similar to those given in Table A were obtained in every case.

In another series of experiments, 72 washes (still containing fermentable sugars) were re-examined 1 to 6 months (12 after 1 month; 12 after 2 months; 12 after 3 months; 12 after 4 months; 11 after 5 months and 13 after 6 months) after their receipt in this laboratory. The washes were of different strengths and had been received in connection with excise cases and contained sufficient quantity of salicylic acid (*i.e.*, 25 grains per quart or more). In none of these cases had the alcoholic strength increased appreciably, but in 5 of these cases the alcoholic strength had slightly diminished due to acetic fermentation. These results show that salicylic acid is quite a suitable preservative for arresting the further alcoholic fermentation of partially fermented washes received in excise cases.

We next directed our attention to the study of the action of the preservatives on unfermented sugar solutions. It had been noticed in this laboratory that when unfermented cane juice or gur solutions were left for some time without the addition of any yeast, appreciable amounts of alcohol were formed. Thus it was found in a set of 18 experiments that the alcoholic strength went up to 2 to 6% of proof spirit in 10 cases and to 6 to 13% of proof spirit in 5 cases. These differences in alcoholic strength are probably due to the differences in quantity and nature of yeast *naturally* present in the original cane juice and gur solutions. An ideal preservative should, therefore, not only prevent the further fermentation of partially fermented solutions but also of unfermented sugary solutions. Tables B and C show the course of fermentation of unfermented

TABLE A

Showing the percentage of proof spirit formed during a period of six months after the addition of preservatives to partially fermented Gur solutions

Concentration of Gur solution before fermentation		35%				25%					
Preservative used (25 grains per quart bottle of 20 fl. ozs. capacity)		Salicylic acid	Benzoic acid	Mercuric iodide in KI	No preservative	Salicylic acid	Benzoic acid	Mercuric iodide in KI	Formic acid	Ammonium fluoride	No preservative
Starting day	..	12.3	12.3	12.3	12.3	7.9	7.9	7.9	7.9	7.9	7.9
After 15 days	..	12.3	12.3	12.3	24.7	7.9	7.9	7.9	7.9	7.9	10.2
„ 30 „	..	12.3	12.3	12.3	(Maximum)	7.9	7.8	7.8	9.2	7.9	16.8
„ 45 „	..	12.3	12.3	12.3		7.9	7.8	7.8	9.8	7.9	(Maximum)
„ 60 „	..	12.3	12.3	12.3		7.8	7.8	7.8	12.1	7.9	
„ 90 „	..	12.2	12.2	12.2		7.8	7.8	7.8	14.4	9.5	
„ 120 „	..	12.2	12.2	12.2		7.7	7.7	7.7	15.6	11.4	
„ 150 „	..	12.1	12.1	12.1		7.7	7.7	7.7	16.1	15.1	
„ 180 „	..	11.8	11.7	11.8		7.7	7.7	7.7	16.2	15.2	

Concentration of Gur solution before fermentation		15%					10%				
Preservative used (25 grains per quart bottle of 20 fl. ozs. capacity)		Salicylic acid	Benzoic acid	Mercuric iodide in KI	Formic acid	No preservative	Salicylic acid	Benzoic acid	Mercuric iodide in KI	Formic acid	No preservative
Starting day	..	5.4	5.4	5.4	5.4	5.4	4.3	4.3	4.3	4.3	4.3
After 15 days	..	5.4	5.4	5.4	5.4	8.4	4.3	4.2	4.3	4.3	5.4
„ 30 „	..	5.4	5.4	5.4	5.5	9.9	4.3	4.2	4.3	5.5	6.2
„ 45 „	..	5.4	5.4	5.4	6.7	10.8	4.3	4.2	4.3	5.9	7.9
„ 60 „	..	5.4	5.4	5.4	7.5	(Maximum)	4.3	4.2	4.3	6.2	(Maximum)
„ 90 „	..	5.4	5.4	5.4	9.0		4.2	4.2	4.2	7.7	
„ 120 „	..	5.3	5.3	5.4	9.4		4.1	4.1	4.2	7.5	
„ 150 „	..	5.3	5.3	5.4	9.7		4.1	4.1	4.2	7.5	
„ 180 „	..	5.3	5.3	5.4	9.6		4.1	4.1	4.1	7.5	

TABLE B

Showing the percentage of proof spirit formed during a period of six months after the addition of preservatives to unfermented sugar solutions

Nature and concentration of sugary solution taken	YEAST ADDED									
	25% Gur solution				25% Gur solution with another sample of Gur			15% Gur solution		
Preservative used 25 grains of the acid or the acid equivalent per quart bottle of 20 fl. ozs. capacity	Salicylic acid	Salicylic acid	Benzoic acid	No preservative	Salicylic acid	Benzoic acid	No preservative	Salicylic acid	Benzoic acid	No preservative
Starting day ..	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
After 15 days ..	12.2	12.3	Nil	12.4	13.5	Nil	10.7	Nil	Nil	9.2
„ 30 „ ..	16.4	17.3	Nil	11.4	19.2	Nil	13.8	5.3	Nil	10.1
„ 45 „ ..	16.4	17.6	Nil	7.5	19.6	Nil	14.6	9.4	Nil	9.4
„ 60 „ ..	16.4	17.0	Nil	7.6	19.5	Nil	14.4	10.6	Nil	6.3
„ 90 „ ..	15.6	16.2	Nil	5.2	19.4	Nil	14.1	12.1	Nil	Highly acetic fermentation then developed
„ 120 „ ..	15.6	16.2	Nil	4.8	19.3	Nil	14.1	12.1	Nil	
„ 150 „ ..	15.4	16.1	Nil	4.5	19.1	Nil	8.4	12.1	Nil	
„ 180 „ ..	14.7	15.2	Nil	3.9	18.3	Nil	7.8	11.9	Nil	

Nature and concentration of sugary solution taken	YEAST ADDED							WITHOUT ADDED YEAST					
	25% Mahua extract			25% Gur solution with another sample of Gur				25% Gur solution			25% Gur solution with another sample of Gur		
Preservative used 25 grains of the acid or the acid equivalent per quart bottle of 20 fl. ozs. capacity	Salicylic acid	Benzoic acid	No preservative	Sodium salicylate	Sodium benzoate	No preservative	Salicylic acid	Benzoic acid	No preservative	Salicylic acid	Benzoic acid	No preservative	
Starting day ..	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	
After 15 days ..	0.1	Nil	15.4	8.3	Nil	5.4	2.0	Nil	5.4	0.5	Nil	17.5	
„ 30 „ ..	9.2	Nil	15.2	15.4	Nil	10.4	6.8	Nil	7.1	0.7	Nil	16.9	
„ 45 „ ..	15.3	Nil	15.2	15.9	Nil	11.6	15.7	Nil	7.9	0.5	Nil	16.2	
„ 60 „ ..	17.2	Nil	15.1	15.9	Nil	11.6	15.6	Nil	7.9	0.5	Nil	16.1	
„ 90 „ ..	17.5	Nil	15.1	15.9	Nil	11.8	15.5	Nil	9.1	0.5	Nil	16.1	
„ 120 „ ..	17.2	Nil	14.9	15.8	Nil	10.4	15.4	Nil	10.4	0.5	Nil	16.0	
„ 150 „ ..	17.1	Nil	14.8	15.8	Nil	7.1	15.2	Nil	13.1	3.5	Nil	15.9	
„ 180 „ ..	16.9	Nil	14.6	15.5	Nil	6.7	15.2	Nil	13.5	3.8	Nil	15.7	

TABLE C

Showing the percentage of proof spirit formed during a period of six months after the addition of preservatives in unfermented Gur solutions to which yeast had been added

Concentration of Gur in the solution before fermentation started	25%					15%		
Preservative used (25 grains per quart bottle of 20 fl. ozs. capacity).	Salicylic acid	Benzoic acid	Mercuric iodide in KI	Formic acid	No preservative	Salicylic acid	Benzoic acid	Mercuric iodide in KI
Starting day ..	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
After 15 days ..	Nil	Nil	Nil	Nil	2.0	Nil	Nil	Nil
.. 30 ..	2.4	Nil	Nil	Nil	4.0	Nil	Nil	5.9
.. 45 ..	13.4	Nil	15.9	9.7	7.9	Nil	Nil	12.0
.. 60 ..	13.8	Nil	16.1	18.5	10.2	Nil	Nil	12.5
.. 90 ..	13.6	Nil	16.1	18.4	16.8	Nil	Nil	12.6
.. 120 ..	12.3	Nil	15.2	18.2	(Maximum)	1.9	Nil	11.9
.. 150 ..	12.3	Nil	15.2	17.8		2.8	Nil	11.9
.. 180 ..	11.8	Nil	15.2	17.7		3.2	Nil	11.8

Concentration of Gur solution before fermentation started	15%			10%			
Preservative used (25 grains per quart bottle of 20 fl. ozs. capacity)	Formic acid	No preservative	Salicylic acid	Benzoic acid	Mercuric iodide in KI	Formic acid	No preservative
Starting day ..	Nil	Nil	Nil	Nil	Nil	Nil	Nil
After 15 days ..	Nil	1.5	Nil	Nil	Nil	Nil	1.0
.. 30 ..	Nil	2.8	Nil	Nil	Nil	Nil	1.4
.. 45 ..	0.5	5.4	Nil	Nil	Nil	0.4	3.1
.. 60 ..	0.5	8.4	Nil	Nil	Nil	0.4	4.3
.. 90 ..	0.5	9.9	Nil	Nil	Nil	0.4	5.4
.. 120 ..	0.3	10.8	Nil	Nil	Nil	0.4	6.2
.. 150 ..	0.3	(Maximum)	0.2	Nil	0.1	0.7	7.9
.. 180 ..	0.3		0.5	Nil	1.0	2.2	(Maximum)

sugary solutions (with and without addition of yeast) to which various preservatives had been added. It would be seen from these tables that benzoic acid alone prevents the fermentation

of unfermented sugar solutions and that salicylic acid is not a suitable preservative for this purpose. Benzoic acid (25 grains per quart) should therefore be used in place of salicylic acid for arresting further fermentation of suspected washes seized in connection with excise cases. When salicylic acid is used as a preservative, there is a possibility of miscarriage of justice in cases where unfermented sugary solutions are seized, for salicylic acid does not check the fermentation of unfermented sugary solutions containing active yeasts.

Finally, experiments were made to see whether smaller quantities of benzoic acid would check further fermentation of washes. It was found that even 15 grains of benzoic acid per quart effectively stop the fermentation of unfermented sugary solutions (and also completely check the further fermentation of partially fermented washes) for a period of 6 months.

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A NEW HOST—*RICINUS COMMUNIS*—
FOR *LÉVEILLULA TAURICA*
(LÉV.) ARN. [*OIDIOPSIS TAURICA*
(LÉV.) SALM.]

DURING recent years the castor crop on the Central Agricultural Research Station, Coimbatore has been subjected to infection by an endophytic powdery mildew. The disease is prevalent in the months of November–March. The mildewy growth is mainly confined to the lower surface of the leaves (Fig. 1). In advanced stages of heavy infection white growths are present on the upper surface also in some places. Corresponding to the mildew areas on the lower surface, light green patches can be seen from the upper side especially when the leaves are held against light. The disease is absent on the youngest leaves at the ends of branches.

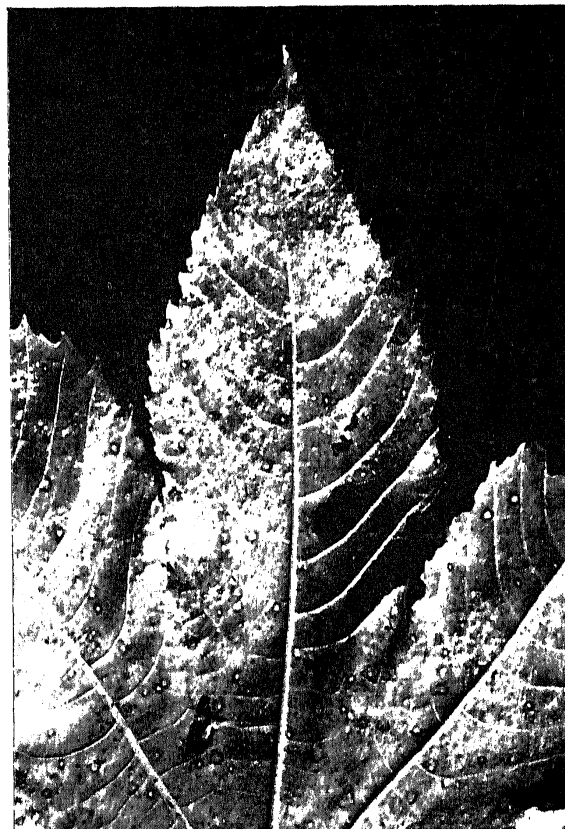


FIG. 1

Portion of a castor leaf (lower surface) showing powdery mildew.

The hyphæ are intercellular and occupy the spongy parenchyma of the mesophyll. Haustoria are produced and these penetrate into some of the parenchymatous cells. Conidiophores come out through the stoma in varying numbers. Branches develop from many of the conidiophores. Each branch produces one conidium at the tip. The conidia are hyaline and vary in shape, some having a tapering apex and others broad ends. Most of the conidia have a minute papilla-like projection at the broad end (Fig. 2b). They germinate readily in water producing a germ tube from one end and rarely from both ends (Fig. 2c). The spores measure on an average $67.3 \times 18.7\mu$. The ranges and their frequencies of the length and width of 200 conidia are given in the accompanying table.

The measurements and the distribution of the range agree with those of *Oidiopsis taurica*.

O. taurica has been observed on *Cyamopsis tetragonoloba*, *Capsicum annuum*, *Medicago sativa*, and *Vinca pusilla* from South India. *O. taurica* var. *macrospora* is present on *Dolichos*