PANEL DISCUSSION ON INSECTICIDES, FUNGICIDES, SOIL FUMIGANTS, HERBICIDES AND SOIL FERTILITY

A panel discussion was held by the Vegetable Section of the Florida State Horticultural Society Thursday afternoon. Leaders included E. G. Kelsheimer and N. C. Hayslip on insecticides; R. A. Conover and J. M. Walter on fungicides; E. L. Spencer and V. F. Nettles on soil fumigants; R. A. Dennison on herbicides; and G. M. Volck and P. J. Westgate on soil fertility. F. S. Jamison acted as Moderator for the panel.

It was possible, through the panel, to present new information on a number of topics other than those covered by specific papers given before the Society.

The panel was exceptionally well attended and the discussion quite spirited, which reflected the keen interest of those in attendance.

A RAPID METHOD FOR THE DETERMINATION OF PEEL OIL IN CITRUS JUICES

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Several years ago we were faced with a problem common in the industry, that of trying to guess by feeling the oranges or by tasting the juice whether the product would meet the specifications on peel oil. The official Clevenger method was unsuitable for production control because of the 1½ hours required for a peel oil determination.

Duplicate peel oil determinations by the Clevenger method on identical juice samples will usually give divergent results. These cannot be averaged, as the higher one, obviously, is most nearly correct. Examination of the Clevenger operation reveals two major sources of error. First, the steam vapors from the distillation flask carry the peel oil to the top of the condensation zone, from where it must work its way downward against the rising steam to reach the oil trap. The result can only be loss of oil by evaporation and by adhesion to the condenser walls.

Although high and consistent recoveries can be obtained with added limonene, as would be expected from the ease with which this terpene can be steam distilled, the second source of error is from peel oil remaining in the distillation flask throughout the determination. Part of the oil present in the juice is in large droplets which distill over rapidly, but much of the oil present is thoroughly emulsified and is removed only with great difficulty.

The Clevenger apparatus should not, therefore, be considered as an absolute standard, but rather as an attempt to obtain consistent results by standardizing apparatus and operating conditions.

The temperature of the vapor from a juice distillation will not stay at 96° or 97° C. until the oil is removed and then rise to 100°, as it would if the distillation were carried out under equilibrium conditions, but the reverse procedure will follow the equilibrium closely. This means that if we boil the juice very rapidly and violently to distill off the oil, we can, by lowering the temperature of the vapor to 97° C., condense out all the excess water. The remaining water and the limonene may be condensed separately and the oil measured. This opens the way for a rapid, accurate oil determination apparatus operating as follows:

Vapor from rapidly boiling juice is passed...
through a condenser at 97° C. and the condensate returned to the boiler. Peel oil, non-condensible at this temperature in the presence of steam, is vented into an auxiliary condenser, collected and measured.

A full scale machine with condenser capacity to handle an evaporation rate of 200 ml. per minute at a condensing temperature of 97° C. was built and used during the 1948-49 season to test, prior to canning, each batch of single strength orange juice produced at Dunedin.

Referring to Fig. 1, operating procedure is as follows:

With the main condenser temperature controlled at 96.5° to 97° C. and ice water flowing through the auxiliary condenser, about 500 ml. of water is introduced into the apparatus, and the steam turned on. The water is allowed to boil to clear air from the system, and the boiling rate is adjusted to allow the escape of a small amount of steam from the main condenser vent. Then a 1 liter juice sample is poured in slowly (600 to 700 ml. per minute) so as not stop the evaporation. A 5-minute interval is allowed for the oil to be vaporized and to work through to the second condenser. The oil trap is then removed and the peel oil volume noted. With the machine in standby condition, a complete oil determination can be made in 7 minutes.

Some typical peel oil results on single strength orange juice follow. These are from our 1948-49 laboratory records.

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<tr>
<th>Rapid Method</th>
<th>Clevenger</th>
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*—Condenser water held at 40° F. to allow high boiling rate.

**Conclusions**

The apparatus furnishes a rapid and accurate oil determination method, but unless immediate results are needed for process control, the equipment will be found cumbersome and expensive as compared to the standard Clevenger method.

THE ISOLATION, CULTIVATION AND IDENTIFICATION OF ORGANISMS WHICH HAVE CAUSED SPOILAGE IN FROZEN CONCENTRATED ORANGE JUICE.

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During the 1949-50 season, this laboratory was requested to investigate spoilage in frozen concentrated orange juice. This spoilage was characterized by a "buttermilk" off-odor which was detectable in the blending tanks before the product was filled into the cans.