NEWS

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Orange Concentrate Climbs By Leaps and Bounds

Freeze concentration said to prevent flavor loss . . . Molybdenum plays dual role in Florida agriculture

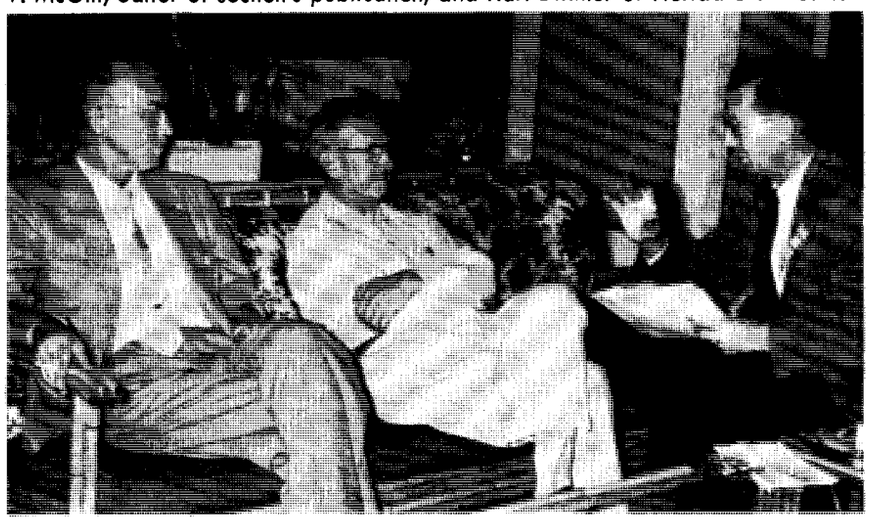
ST. PETERSBURG.—Since 1942, Florida has produced more citrus than any other state, reported F. W. Wenzel, University of Florida Citrus Experiment Station, before the ACS Florida Section's Meeting-in-Miniature here May 14–15. During the 1952–53 season Florida's production was equivalent to 63% of the nation's total citrus crop. This crop, according to Wenzel, included 60% of the oranges (72 million boxes) and 85% of the grapefruit (32 million boxes).

Wenzel said frozen orange concentrate production has progressed from 226 thousand gallons in 1945–46, the first season of commercial production, to more than 46 million gallons in 1952–53. Today 23 plants are packing frozen citrus concentrates in Florida. Prior to May 1, they had already packed almost 48 million gallons of frozen orange concentrate with about six weeks still available for processing.

Grapefruit production in Florida is often greater than the demand, indicated Wenzel. There is a very large crop this season, estimated at 38 million boxes. Prices are depressed and the situation is quite critical. Much thought has been given to this problem by the industry; recently some effort has been made to further improve the quality of processed grapefruit products, both canned juice and concentrate. The trend in processing grapefruit, indicated Wenzel, has been toward the use of more mature fruit with a lower acid content, and toward the elimination of extreme bitterness in the juice by modification of juice extraction and finishing operations.

One commercial plant packed lemonade concentrate in Florida last season but the quantity of fruit available was extremely small. About one fourth of the Florida production of seedless limes (75,000 boxes) was used in 1953 for limeade concentrate. According to Wenzel, over 500,000 gallons of frozen tangerine concentrate were produced last year, and interest has recently been shown for the production of a frozen Temple orange concentrate.

How to increase college enrollments in chemistry and chemical engineering promoted a lively discussion at the ACS Florida Section's meeting-in-miniature. Here W. N. Simpson of American Agricultural Chemical Co. talks problem over with M. V. McGill, editor of section's publication, and Karl Dittmer of Florida State Univ.



Freeze Concentration. Citrus concentrates experience a loss of part of the true fruit flavor during vacuum processing, stated R. A. Nanz, Florida Chemists and Engineers, Inc. The flavor esters, he said, are pulled out during low temperature evaporation and are carried away in the condensate water. According to Nanz, freeze concentration prevents this loss of flavor.

By this new method, the major portion of the ultimate concentrate is produced complete with all the natural flavors found in fresh juice. It is never subjected to vacuum nor heated. The juice is frozen into a slush and passes through a high speed centrifuge. High ester 30° Brix juice (approximately 30% solids—sugars, citric acid, and other natural flavor solids) is the first cut from the centrifuge. The second cut is the ice crystals which trap approximately 5° Brix or 5% solids.

The second cut is melted and concentrated with standard low temperature evaporators. This yields 60° Brix concentrate, which is blended back to give the desired 42° Brix concentrate. However, the final concentrate contains much more of the flavoring esters than standard citrus concentrates, claimed Nanz.

The juice has a very low pectin-splitting enzyme content, indicated Nanz. By inactivation of this enzyme, the normal cloud is preserved in the juice, and separation is prevented. Many concentrates separated, according to Nanz, with a clear zone in the center of the reconstituted juice; the heavy pectinous solids settle and the pulpy particles float.

The enzyme-bearing pulpy component of the juice is trapped in the ice crystals during processing, and is separated in the second cut. This ice component is flash heated between 165° and 170° F. for 6 to 8 seconds, permanently inactivating the pectinesterase. The first cut contains very little enzyme activity. Many have declared the new frozen concentrate as a superior product, said Nanz.

Florida Molybdenum. Molybdenum plays a dual role in Florida agriculture, reported Nathan Gammon, University of Florida. On the peat and muck soils

sufficient molybdenum may be present to cause toxic levels in herbage eaten by cattle. When this toxicity occurs it may be overcome by use of copper sulfate in the fertilizer or in drenches for the cattle. On very acid, sandy soils in limited areas, molybdenum deficiency has been found in citrus and cauliflower. Applications of molybdenum to the soil, use of molybdenum sprays, and raising soil pH have successfully overcome molybdenum deficiency. Wherever possible, raising soil pH is preferred to molybdenum applications, said Gammon, because molybdenum does not readily leach from acid soils, and there could be a potential danger to cattle if the fields were converted to pasture following repeated applications.

R. M. Sandstedt (right) receives the Thomas Burr Osborne Medal from R. A. Barackman of Victor Chemical, president of AACC. Medal is awarded for outstanding contributions to the field of cereal chemistry.

CarbonDioxide Aids Wheat Storage

Gas in interseed atmosphere has beneficial effect on stored wheat . . . Underground storage of grain found to give effective insect control

DENVER.—Carbon dioxide tensions above 12 to 18% lower respiratory rate, mold count, and fat acidity formation in stored wheat. The widely held conception that to avoid "sick wheat" it is necessary to turn stored grain to keep interseed atmosphere composition the same as that of outside air is false, W. F. Geddes, University of Minnesota, told the American Association of Cereal Chemists at the 39th annual meeting here May 23 to 27.

In laboratory experiments lasting from 14 to 21 days, various gas mixtures of known composition were passed through samples of hard red spring wheat. Air containing small quantities of carbon dioxide was found to increase the time lag in the respiratory rate curve, but later stimulated respiratory activity. However, concentrations above 12% lowered the respiratory rate. Small amounts of carbon dioxide also increased mold count, but above the 13% level there was a sharp reduction in count. Increased carbon dioxide reduced fat acidity values.

Effects of changing oxygen content were found to be opposite to those of varying carbon dioxide. Respiratory rates were decreased by lowered oxygen concentrations. Germ damage, which decreased with increasing carbon dioxide, increased with greater oxygen tensions. Viability rose with larger amounts of carbon dioxide and dropped with increasing oxygen. Molds were rather tolerant of varying oxygen concentrations; unless the percentage of oxygen was reduced quite drastically, there was no effect on stored grain, said Geddes.

Underground Storage. Underground bulk storage of grain was first developed in Argentina, but it has now been found practical for use in tropical climates, according to T. A. Oxley, Pest Infestation Laboratory, Slough, England. In experimental pits in East Africa, complete control of insect infestation without any need of turning the grain was obtained.

The pits were several yards wide, of a similar depth, and have a considerably greater length. They were lined with concrete, waterproofed, and filled with grain until flush with the top of the pit. A flexible waterproof covering was then sealed over the top so that the compartment was as air tight as possible.

Mechanism of insect control is not clear, but gaseous changes are probably responsible. Carbon dioxide content of the enclosed gas rose but this increase alone did not appear to be sufficient to kill insects. In East African pits which have been studied carbon dioxide content rose gradually to about 8 to 10%. In one pit the level reached 5% and then dropped slowly. Subsequent investigation showed that insect infestation was quite high in this pit.

Heat loss to soil has been suggested as an explanation of the success of the method since the resulting cooling might help. Available data do not indicate that this is responsible. Lowest temperatures measured in East African pits were about 80° F., while those reported in Argentina ran about 73° F.

Corn Steeping. Control of the lactic acid fermentation which takes place during steeping of corn prior to wet milling is critical in controlling the operation of a steeping battery. Heretofore, only standard bacteriological methods have been used to follow the fermentation. A more effective method was described by S. A. Watson of Corn Products.

The technique measures the actual lactic acid producing ability of a sample of steepwater by adding a known amount of dextrose, incubating for a definite time, and titrating the acid formed. Highest relative acid-forming activities were found in the first two of the 12 steep

S. A. Watson, Corn Products; T. A. Oxley, Pest Infestation Laboratory, Slough, England; and W. F. Geddes, University of Minnesota, discuss the work they described before the Cereal Chemists