

chemically treated pectic substances have been determined. Three forms of pectic substance, designated acid, salt, and ester, were used in the study. Although it is well known that pectin swells when water is absorbed, these studies indicate that, in the swelling process, new groups for the sorption of water are made available for the acid and salt forms, but not for the ester form.

Although these studies are primarily of theoretical interest at present, they may finally yield information valuable both for the utilization of plant waste material and for the processing of food products.—*D. H. Volman, Dept. of Chemistry, Davis.*

#### Microscopic

### MITES ON BEES

A search for internal and external mites on bees, extending to various parts of the United States and Canada, revealed that external mites have been infesting bees for many years without causing any observable symptoms of the Isle of Wight or acarine disease. They are microscopic in size, never invade the breathing system of the bee, and have no connection with the disease. No internal mites—considered to be the cause of the disease—were discovered during the search. Two species of external mites, their biology, distribution, relationship to the life of the bees and to the economy of the hive are being studied.—*J. E. Eckert, Dept. of Entomology, Davis.*

#### Sunlight intensity tests on

### ORNAMENTALS

To determine the sun and shade requirements of ornamental plants, an experimental shade shelter was constructed with large panels of woven Saran cloth on the top of a large frame. The sides were not covered so sunlight could enter from the sides. Depending on the season of the year and the time of day, 55 different sunlight intensity situations can be tested under this shelter.

Plant material is planted in north-south rows at five different locations across the shelter in an east-west direction. During the first growing season, turfgrass, ground-cover, and certain herbaceous species have been evaluated as to plant size, density of growth, abundance of flowering, and insect and disease tolerance under the various sunlight conditions.—*R. W. Harris, Dept. of Landscape Horticulture, Davis.*

## MODIFIED ATMOSPHERES

### for vegetables after harvest

Modified atmospheres—the changing of the carbon dioxide and oxygen concentrations in the air—alter the rate of respiration, ripening, and deterioration of fruits and vegetables after harvest and may prolong their storage life. The effect of modified atmospheres is specifically under study on the postharvest behavior of tomatoes, lettuce, and Brussels sprouts. The air conditions of a sealed storage room or a container are simulated, and practical possibilities will be assessed. These could include the use of plastic film liners, dry ice, or direct addition of a gas or gas mixture into containers or load space.

The value of modified atmospheres is under investigation for vine-ripened tomatoes, which reach nearby markets in good condition but may be too ripe and soft on arrival at distant markets. Modification of the atmosphere may be commercially useful for retarding the rate of ripening under certain conditions, but the tomatoes are injured by marked changes in carbon dioxide and oxygen concentrations, especially when prolonged beyond a few days. Although use of modified atmospheres is not likely to replace temperature control, it may have supplementary value for various vegetables.—*L. Rappaport and L. L. Morris, Dept. of Vegetable Crops, Davis.*

#### Size relations of

### CANNING PEACHES

The relationship of canning-peach sizes at various times prior to harvest and those at harvest is under study. In recent years the correlation between fruit size at one specific early-season date—reference date—and at harvest has been the basis of evaluating the thinning problem. Size at reference date has also been used to estimate size at harvest. It is known, however, that reference date size can only be the first approximation of harvest size. Factors affecting fruit growth, particularly those related to environment or cultural practices, may occur in amounts different from those earlier in the season.

From the data of the current studies it is expected that estimates of harvest size can be made at various times between reference date and harvest. Such estimates would supply information about growth behavior of the fruit at intervals after the reference date; and fur-

nish a series of estimates of harvest sizes which will verify or modify the reference date projections and thereby provide increased confidence in the estimates of final size.—*Luther D. Davis, Dept. of Pomology, Davis.*

#### Study on control of

### FRUIT RIPENING

The nature of physiological and biochemical changes in the fruit during its development and ripening is being studied in melons, tomatoes, and peppers. Particular attention is being devoted to the stage when the fruit has reached maturity but before final ripening starts. The experiments aim at determining the influence that finally triggers the ripening process—it may be the production of ethylene within the fruit, or a critical change in the concentration of some metabolic regulator. Ethylene, a gas produced by fruits during the final ripening process, is known to affect fruit ripening, but it has not been known when ethylene production starts. Use of sensitive detectors available in gas chromatography may make it possible to determine ethylene concentrations within plant tissues. Determination of the exact beginning of ethylene production in the fruit may help answer questions as to the role of this gas in ripening—whether it controls ripening directly, or whether it is in turn controlled by some other process. The principles of fruit ripening—which may lead to ripening control by man—are similar for most kinds of fruits investigated.—*Harlan K. Pratt, Dept. of Vegetable Crops, Davis.*

#### Reduction of impurities in

### DISTILLATION OF BRANDY

A simple, inexpensive, and efficient process was developed to eliminate the impurities and utilize the alcohol contents of the heads that accumulate at the top of the distilling column during the distillation of wine into brandy. The process uses fermenting yeast to reduce the undesirable substances—mainly acetaldehyde—and has been widely accepted by the California wine industry. Heads are recycled to a tank of new distilling material at a time when it has attained vigorous fermentation.

During distillation these impurities—responsible for hot or burning tastes in alcoholic beverages—accumulate in the heads at the top of the still. Most brandy



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producers separate as much as 10% of the distillate as heads. While this fraction contains impurities in amounts many times higher than remain in the brandy, alcohol is still the main compound of heads. Recovery of this alcohol in usable form has been a processing problem in the wine industry.

Processes such as redistillation and chemical treatment have been used, but generally are expensive or ineffective. Knowledge of the basic reactions taking place during alcoholic fermentation made it possible to predict that yeast would reduce aldehydic impurities added to fermentation. This was soon demonstrated in the laboratory. Further studies worked out proper conditions including the best time for addition to fermentations and

optimum levels for effective reduction of the impurities with minimum toxic effect to fermentations. All the tested species and strains of fermentative yeast reduced impurities.—James F. Guymon, Dept. of Viticulture and Enology, Davis.

### Improved strain of

## HONEYBEES

The development of better bees—more efficient pollinators for California agriculture—is the subject of a current research program. The breeding of improved honeybees requires application of proper breeding techniques, thorough knowledge of the bee and beekeeping, and the development of special beekeeping methods. In addition, the mating of the queen must be controlled by artificial insemination, environmental influence must be minimized, and special techniques must be employed to measure the

characteristics of the honeybee colony. The studies also give attention to general inheritance in the honeybee, to sex and caste determination, development and reproduction, morphology, physiology, ecology, and behavior.

The need for a better bee has become urgent because California agriculture is becoming increasingly dependent upon honeybees for the pollination of insect-pollinated crops. The reasons for this dependence are the widespread use of insecticides which are injurious to wild bees as well as to honeybees, and the clean cultivation and weed-control practices that have reduced the wild flowers which provide the spring and fall honeyflows for wild bee populations. Honeybees, in contrast to wild bees, can be moved from one area to another as needed. They vary in their pollinating efficiency, and the breeding work, so far, indicates selection for pollen gathering is effective.—Harry H. Laidlaw, Dept. of Entomology, Davis.

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